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To provide information on the relationship of automation to changing occupational patterns and related worker displacements, examples of automation and technological change in industry are given. Some summary findings are: (1) Technological advancements cause some jobs to disappear and also cause some new jobs to appear, (2) Many workers dispaced from disappearing jobs usually do not possess the knowledge, skills, and education needed to perform the new, more highly skilled jobs, (3) Worker displacements are inherent in the process of automation, (4) It appears that worker displacements in smaller numbers or as isolated cases take place much more frequently than generally supposed, and (5) Corrective measures must be rapidly applied to prevent displaced workers from slipping into the unemployed habit. Examples of displacement due to automation are given in areas of (1) mining, (2) manufacturing, (3) transportation, communication, electric, gas and sanitary services, (4) wholesale and retail trade, (5) finance, insurance and real estate, (6) services, and (7) government. (DM)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF LABOR AND INDUSTRY
BUREAU OF EMPLOYMENT SECURITY

Pennsylvania State Employment Service

AFFILIATED WITH UNITED STATES EMPLOYMENT SERVICE

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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The Effects Of Automation On Occupations And Workers In Pennsylvania

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AUTOMATION MANPOWER SERVICES SECTION
Technical Services Division,
Harrisburg, Pennsylvania

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PURPOSE OF THIS PUBLICATION

THIS PUBLICATION CONDENSES more than 100 examples of automation submitted by local offices to illustrate the kinds of technological advancements taking place in a wide variety of industries throughout Pennsylvania. These reports describe what is happening to jobs and workers in actual situations.

THE PURPOSE OF THE PUBLICATION is to provide up-to-date factual information on the relationship of automation to changing occupational patterns and related worker displacements. This has been made possible through the cooperative efforts of ES staff members across the State who collected data and prepared reports for the Automation Manpower Services Section in response to Field Operations Memorandum No. 55.

THE FIRST OF ITS KIND, the publication will be of interest to all ES personnel. It will be particularly helpful to Occupational Analysts, Employer Relations Representatives, Interviewers and Counselors as a source of information on what is actually happening to jobs and workers in the automated world of today.

FORMAT

THE TABLE OF CONTENTS indicates the industries in which examples of automation and technological change are given. General comments follow the examples given for each industry. Statistics quoted here are from the January 1965 issue of "Pennsylvania Employment and Earnings" published by the Pennsylvania Bureau of Employment Security. Additional figures, where indicated, are taken from an analysis of information contained on ES-235 forms (Establishment Report of Mass Layoff) submitted by local offices from September 1962 to the present time.

A DETAILED INDEX at the end of the publication lists all examples by Standard Industrial Classification and indicates the nature of the new automated processes. This makes it possible to study specific technological changes being introduced in specific industries.

HIGHLIGHTS OF THE REPORTS

Automation and Jobs

TECHNOLOGICAL ADVANCEMENTS CAUSE SOME JOBS TO DISAPPEAR or be less in demand, and, at the same time, create other jobs with new or different skills. Some of the more skilled jobs shown to be disappearing include machinists, machine operators, linotype operators, bookbinders, compositors, printers, pressmen, welders, linemen, meter readers, etc. As these jobs diminish, the apprenticeship programs related to them also diminish. Semi-skilled and unskilled jobs which are disappearing include testers, inspectors, packers, spinners, proofreaders, collators, truck drivers, helpers, and all kinds of general laborers.

TECHNOLOGICAL ADVANCEMENTS ALSO CAUSE NEW JOBS TO APPEAR. Some of the new jobs appearing include electronic console specialists, machine adjusters, electronic technicians, and maintenance mechanics in all kinds of industries. Changes in the nature of jobs in the clerical field are particularly drastic as routine jobs become coordinating activities in electronic data processing installations, and new jobs, such as tape perforation machine operators, programmers, coders, computer technicians and project planners, emerge. Even foremen and supervisors are vulnerable to displacement as changing job activities decrease the need for their services.

UNFORTUNATELY, MANY WORKERS DISPLACED FROM DISAPPEARING JOBS in any category usually do not possess the knowledge, skills and education needed to perform the new jobs which are coming into being as the result of automation.

Automation and People

ALTHOUGH MANY EMPLOYERS INDICATE that the technological changes being introduced will not result in layoffs because of worker reassignments and gradual work force reduction through normal attrition, it is evident that little or no hiring is anticipated after the improvements are accomplished. In spite of sincere efforts by employers to cushion the impact of automation on employes, it is obvious that worker displacements, whether small or large in number, are inherent in the process of automation on any scale.

IT ALSO APPEARS that worker displacements in smaller numbers or as isolated cases take place much more frequently than generally supposed. Large mass layoffs are more dramatic and bring public concern and community action but these less dramatic smaller displacements are of equal importance, particularly to those personally involved.

THE CHALLENGE FOR THE EMPLOYMENT SERVICE

ALL WORKERS WHO LOSE THEIR JOBS through technological change, whether in a mass layoff or as isolated cases, face special reemployment problems which must be recognized during initial local office contact and acted upon quickly. Immediate APPLICATION OF INTENSIFIED PERSONALIZED ES SERVICES is essential to promote occupational re-orientation, minimize unemployment, and meet retraining needs.

AS A RESULT OF SEVERAL RESEARCH STUDIES ON AUTOMATION made here in Pennsylvania, we have gained some valuable knowledge. We know that displaced workers have certain characteristics in common which indicate a workable approach to the early identification of the long-term unemployed. We know that training of any kind enhances reemployment, even for unrelated occupations. We know, too, that attitudes about wages, mobility, and retraining are often unrealistic and resistant to change at the time of displacement. However, attitudes become realistic and resistance lessens in direct proportion to the intensity of the techniques we focus on each worker's individual problems.

WE HAVE GAINED VALUABLE INSIGHT into our own Employment Service operations. Depth interviewing is imperative if we are to identify characteristics quickly and accurately and apply corrective measures to prevent displaced workers from slipping into the "unemployed habit." Counseling and testing are particularly effective if performed soon enough. Perhaps one of the most important lessons we have learned is the realization that our Employment Service operation is fully capable of coping with the complex problems of displaced workers - but only when our techniques are applied immediately and in depth. Timing and quality are of utmost importance in providing all services to these individuals.

THERE IS NO MAGIC FORMULA for solving the problems of a displaced worker. Statistically, he is an older worker with long seniority and a strong emotional attachment to his former company. His income is considerably higher than average. He is frequently a physically handicapped worker with an obsolete skill, reluctant to move, and apprehensive about retraining. He is bewildered and sometimes antagonistic because his security has suddenly been swept away. Most of all, he is in need of understanding, encouragement, and a great deal of patience, because he faces a major crisis in his life at a time when he is least prepared to cope with it.

IT IS THE PROFESSIONAL RESPONSIBILITY OF EVERY MEMBER OF THE EMPLOYMENT SERVICE TO ASSIST EACH DISPLACED WORKER IN HIS TIME OF NEED. IT IS HOPED THE INFORMATION IN THIS PUBLICATION WILL SERVE TO ENCOURAGE A PERSONALIZED VIGOROUS APPROACH IN THE APPLICATION OF OUR SERVICES TO ALL WORKERS WHO FIND THEMSELVES DISPLACED FROM JOBS IN THIS NEW AGE OF INCREASINGLY RAPID TECHNOLOGICAL CHANGE!

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I. MINING

BITUMINOUS COAL AND LIGNITE MINING

1211 - BITUMINOUS COAL - Continuous Mining Method

New production methods were adopted between 1952 and the present period. The current completely mechanized method of production is known as the "Wilcox Continuous Mining Method." Initial installations were made in 1956 and were completed in mid-1959.

Employment before the change in late 1955, was 329 workers. 1964 employment is 78 workers.

Change was gradual, and workers could see the installations as they were made. Therefore, there was not any reason to inform the workers or the mine workers local union. There were not any actions on management's part to alleviate the fears of the workers.

There was only informal union participation in the transition and new job classifications of the retained workers. Rates for the new job classifications were already in existing UMWA contracts. Governmental agencies, including PSES did not assist either management or workers in facilitating this changeover, except for the payment of UI benefits to displaced workers.

Attrition (deaths, injuries and retirements) was used to deplete some of the workers, especially in the early months of the changeover. Workers with mechanical ability were reclassified and retained on the work force. The few workers that were downgraded were paid the wage scale as set up in the UMWA contract.

Workers' pension rights were vested according to the terms of union agreement. There was no special treatment accorded to older workers. Seniority lists were the basis of all selections for new classifications and training was "on the job" type. Workers unable to meet requirements of new classification after 2-3 weeks training were placed on furlough rosters.

Separation pay is not customary in the bituminous mining industry and management did not make any effort to find new jobs for the displaced workers. Below is the story of manpower and production changes since the introduction of mechanical mining at this operation.

Year	Number of Workers	Daily Production
1952	329	X Tons per day
1956	158	Equal to 1952 prod.
1964	78	About 20% above 1952

The firm did not disclose tons per day production in 1952, but the adoption of mechanical mining procedures has definitely kept this firm in a good competitive position.

MINING AND QUARRYING - NON-METALIC METALS

1421 - CRUSHED AND BROKEN STONE - Quarry Operations

During 1963, the operation of this limestone quarry changed drastically. With the completion of a new facility, the quarry can more than double its output with slightly fewer employes than previously employed.

By the old method, stone was blasted from the quarry and transported by trucks to a conveyor that moved the material out of the quarry to a preliminary crusher. The stone was then moved to the various crushers, graders, and washers, to storage areas by truck. In this operation, 4 steam shovels were used with varying capacities of four to six yards. Five twenty-ton trucks, operating 2 shifts, were also used.

In the new quarry, the stone is moved by 2 8-yard shovels and 4 45-ton trucks, operating one shift, to a preliminary crusher, that is housed in a 28' x 28' shaft, 80 feet below the quarry floor. Here the stone is reduced to 10 inch maximum size. The material then rides up a 54 inch wide belt through an 800 foot tunnel, to the Main Processing Plant.

In the Main Processing Plant, which is 10 stories high, the stone is processed into the various finished materials desired by moving through a series of modern crushers, feeders, scrubbers, and screens, connected by 2 1/2 miles of enclosed conveyors. Products range from 10 inch stone down to 100 mesh fine stone. The operation is completely automated. One man controls the entire operation of the Main Processing Building with an automatic electronic control panel, located in the center of the building. There are only 3 additional men employed in this building. Each of these men is responsible for maintenance, trouble shooting, etc., on 3 floors. (The tenth floor is for storage.) Finished materials are then carried by conveyor belt to stackers where it is stored until needed.

Many positions that were required under the old system of operations have been deleted as a result of this advanced mechanical and automation change. However, many of the personnel involved were absorbed in new jobs created as a result of these changes. Around the first of the year, 11 men lost their jobs. However, they have super-seniority and will be recalled as openings develop. Three of these have been recalled to date.

GENERAL COMMENTS

The mining of bituminous coal is now a highly automated industry as evidenced by the 76% reduction in personnel and the 20% increase in production. Both of these accomplishments place the company in a good competitive position in the economic market.

The manufacture of crushed and broken stone increased by 100% - also with some reduction in personnel.

In general, job skills have increased as the result of the introduction of automated machinery. Those workers not able to meet new skill demands are usually separated. An obvious result of automation in mining is the drastic reduction of overall labor costs plus a tremendous increase in production. Production - labor cost ratio is dramatically illustrated in these two examples. One long-range effect is the poor outlook for job prospects in this area as the tempo of automation increases.

Jobs eliminated or reduced in number: Hand labor, truck drivers, power shovel operators, etc.

Mining employment in Pennsylvania has continuously declined from a high of 176,500 in 1950 to 44,900 in January 1965. Coal mining decline is attributed to both automation and the competition of oil and natural and manufactured gas as fuels. New automated facilities to be built in the near future may affect this trend in certain areas.

II. MANUFACTURING

FOOD AND KINDRED PRODUCTS

2013 - SAUSAGES AND OTHER PREPARED MEATS - Continuous Wiener Process

Prior to September 1964, the making of wieners at this company was accomplished by several machines and took a period of six hours to manufacture. Ingredients for the wiener batter had to be mixed and loaded by hand into a sausage stuffer, then taken elsewhere to be smoked, cooked, firmed and finally stripped of their casings. Each operation was time consuming and required machine operators.

In September the company adopted the Continuous Wiener Process System which is accomplished by a single machine developed by a subsidiary company. All the operations required to make a wiener are condensed into this 100 foot machine, which needs only 45 minutes to turn out the finished product without it being handled by any worker until it is ready for packaging.

The ingredients are mixed in a separate room and then piped into the room containing the Continuous Wiener Machine. If any impurities are discovered by an automatic process, a prescribed amount of batter is removed and piped to a waste container. The pure batter continues into the machine, where it is forced under pressure through 12 orifices into artificial casings made of plastic and 110 feet long. At this stage of the process we find the first employe, who sees that the 12 rows of wieners get off to a good start and renews casings as they are used up. All 12 rows of wieners being of uniform thickness and are crimped automatically to uniform length. The rows then disappear into the "tunnel" of the machine where they are smoked, cooked, and chill blasted to make them firm, reappearing 45 minutes later at the far end of the machine.

Now they pass through the stripper phase where small knives slit the casings and suction removes the casing from the wieners. At this stage a second employe is located to see that the casing is completely removed from all wieners. If not, he removes them himself. The finished skinless wieners then are deposited neatly into large containers preparatory to being packaged. All this occurs at the rate of 36,000 wieners per hour!

During the manufacturing phase, if something within the machine is not functioning a light goes on behind a plastic panel denoting the exact malfunction. The machine even washes itself to maintain the cleanliness which is so evident throughout the plant. Of course, where a machine is involved we also find several machine maintenance mechanics to keep this wonder producing.

This company's future is based on automation and consequently they have planned extensively for it. This is reflected in the fact that even though they have grown tremendously within the last 10 years, their overall employment figure has remained the same over this period. With the adoption of the wiener machine, 20 persons were replaced, with the greater number coming from the Stripper classification, which previously was mostly a hand operation. No one was laid off, however, because advanced planning enabled the company to place these workers in other jobs throughout the plant.

2015 - POULTRY DRESSING AND PACKING - Chicken Plucking

This firm purchases live chickens from the poultry grower. Their production was stepped up considerably when they recently moved into new larger quarters. However, the one single factor contributing most to the doubling of production was the installation of a new picking machine manufactured by the Barker Poultry Equipment Company.

No one has been laid off even though the machine does what it required three men to do with the machinery previously used. However, this machine required the part-time services of the maintenance man. Since the installation of the new machine a number of additional workers have been required to handle production and distribution jobs.

As the live chickens are removed from the crates each is hung by both feet to the looped wires of a moving conveyor and is killed in the usual manner. After passing through the scalding area, the chickens reach the first section of the picking machine which consists of two parallel rubber-edged bars one on each side of the line of moving chickens. These bars which extend along the line for about the length of hanging chickens tend to come together just below the knee joint of the fowl and these move downward toward the body of the bird removing the hard-to-pluck feathers from the lower leg area. As this process repeats, each leg is in contact with the feather remover about six times doing a thorough job on all sides of each leg.

Then the chicken enters the main unit where a battery of rotating rubber fingers on each side of the chicken removes the remaining feathers. Sheet metal enclosures on each side confine the flying feathers to the area of the machine where they drop to the floor. Manually adjustable to the size of fowls to be passed between the pickers, this machine ordinarily processes about 980 chickens per hour.

Beyond this machine, the chickens are removed from the conveyor and placed on another conveyor to go through the various butchering processes.

2024 - ICE CREAM AND FROZEN DESSERTS - Popsicles

This company manufactures ice cream and popsicles and bulk milk. Until recently they made popsicles on a 20-year-old machine employing 22 workers on two shifts producing 10,000 dozen popsicles a day.

A new machine manufactured by the Vitalite Company, Sacramento, California, coupled to a wrapping machine manufactured by the Anderson Company, Marion, Indiana, was installed last June. The company gradually reduced the number of workers operating this machine until, at the present time, they employ 8 laborers on 2 shifts, (4 per shift) 17 1/2 hours a day producing 12,500 dozen popsicles.

The manufacturer indicates they have installed 35 such machines, effecting a saving of 10 to 14 workers at each site - or a total of about 420 workers eliminated in the industry. No additional workers are required for washdown or maintenance.

2024 - ICE CREAM AND FROZEN DESSERTS - Ice Cream Molds

The company is engaged primarily in the manufacture of ice cream with a secondary role of producing Popsicles, Refreshos, Creamsicles, Cheerios, and other stick-supported products.

Formerly, the manufacture of these secondary products was performed by using a Brine Tank Refrigerator. The primary operator, or Mold Filler, filled 50-pound cast iron molds with the proper mix using a foot lever. It was necessary to use his own judgment as to the amount that went into each mold. After the mold was filled, it was passed on manually to 4 other employes who inserted stick racks into the mix and made other adjustments including the unloading. Three packers were employed to insert each finished product into a bag; again a manual operation.

Recently, a new Vitaline Machine was purchased which automated this process. The machine, an endless conveyor type, has 2 automatically filled hoppers. The hoppers can be adjusted to dispense from 2 to 6 ounces of mix into 8 stainless steel molds. The molds are taken by the conveyor to the middle section where the sticks are air driven into the mix. The belt continues to the dripping reservoir which contains heated chocolate. A tripper arm submerges each mold into the chocolate where a uniform coating is applied. The belt continues to a previously loaded paper bag magazine where the finished product is released. Two female packers box the products in one dozen lots and place them on a conveyor belt where they are sent to the freezing room.

This operation formerly employed nine workers and now requires three. None of those which the machine replaced were absorbed elsewhere by the company. The advantages of the new method over the old include: a more uniform product; removal of unsanitary conditions; less physical labor and greater production per man-hour.

2024 - ICE CREAM AND FROZEN DESSERTS - Carton Conveyor

This company manufactures ice cream and popsicles and processes bulk milk and, in addition, sells fruit juices and cheese. In their newly constructed plant they have installed a fully automated conveyor system. Filled ice cream cartons will be transported into the freezing room where the ice cream is hardened and maintained at a temperature of 30 degrees F. Cartons are automatically segregated by flavor or combinations of flavors and the number of cartons of each flavor available in the freezing room is automatically tallied.

When needed for shipment, cartons are delivered automatically to the loading platform where they are piled 5 high on skids or rolled directly into refrigerated trucks for delivery to sub-distribution points. The company estimates that this automatic equipment will replace 3 men per shift on 2 shifts or a total of 6 men.

This automatic conveyor system is custom made by the Industrial Products Division of Daffin Corporation, Lancaster, Pennsylvania. This manufacturer now has orders for 7 similar conveyors from other food companies and is negotiating on 8 more prospective sales which indicates the increasing acceptance of this equipment in the food processing industry.

2033 - CANNED FRUIT - Apple Peeling

In the past, 5 women were used on each unit in the apple peeling operation. One of the women put the apples on trays which would then go through the slicing machine and the other 4 women would trim or take the bits of peeling off which had been missed by the machine. The apple slices are then ground into applesauce.

The newer method is relatively the same except that, after the peeling and trimming process, the apple is diced and goes through a filtering screen which removes bits of peeling missed by the women. The use of the filtering screen eliminates the use of one woman on each unit.

At the present time, 28 of the 35 units of this plant have been automated and since it operates two shifts there are 56 fewer persons needed on the peeling units. However, these 56 women were absorbed into other operations in the plant and used as relief or replacement personnel on the peeling units as needed.

One other large cannery in the area began using this system approximately two years ago. However, the personnel released by the automation were absorbed by installing new peeling units and into other operations within the plant.

2035 - VEGETABLE SAUCES AND SEASONINGS - Packaging

This company mixes, processes and packages spices, extracts, food sauces, and a variety of coconut products. Present employment is 285. In 1958, they operated with a combination of mechanized operations and hand operations. In the intervening years, the firm has gradually moved towards more mechanization. In June 1963, six jobs were eliminated by the installation of an automatic packing machine. This machine bears the trade name Klick-Lock. It opens small cardboard boxes from the flat shipping position and places them on a conveyor in a vertical position so that they may be filled with a plastic bag containing coconut. This task was formerly done by hand and when so performed, 8 workers processed approximately 1,400 dozen boxes in an 8-hour shift. With this machine and 2 employes, the present production figure increases to a maximum of 1,900 dozen a day. Increased speed and efficiency in this operation resulted in a corresponding increase in the related tasks of sealing and cartoning.

The 6 workers who were displaced were transferred to the Extract Division where a new installation of a combination of a filling and capping machine manufactured by Pneumatic Corporation and a labeller and cartoner manufactured by Container Equipment Corporation produces up to 3,000 dozen bottles of extract in an 8-hour shift. This equipment is controlled by an electric eye.

2037 - FROZEN FRUITS, ETC. - Frozen Pie Assembly

The manufacturing of pies may be divided into the following phases: preparation of dough; forming of dough; preparation of pie filling and assembly of the pie.

This firm contemplates the installation of modern pie assembly machinery that will increase production approximately 400% without the addition of personnel.

The present pie assembly equipment is obsolete and cannot be purchased any more. It consists of a circular revolving table with 15 pie stations. A pie plate is placed manually on each of these stations. A piece of formed dough is placed manually on each pie plate. As table revolves the pie plates are filled with pie filling from above by injection spouts. A formed sheet of dough is placed (manually) on top (sealed) and pie moves by conveyor to packaging department. This operation produces 30 to 36 pies per minute.

The new equipment will consist of a straightaway (straight-line) moving conveyor system. Pie plates are placed in a hopper and dispensed mechanically on conveyor. The formed dough liner is mechanically placed in pie plate and unit is moved (by conveyor) under injection spouts to receive pie filling. Pie continues to move along to next station where it receives formed top dough and crimping (sealed) action. From this point pie continues to move along conveyor to packaging department.

Feeds, speeds and volumes are correlated through a system of cams, gears and belting (no electronic timing or control) to the effect that pie out-put may be varied from zero to 120 pies per minute.

The supporting equipment, such as dough preparation and forming machine and the pie filling preparation equipment, will not be modified or changed in any way since all of this equipment is modern and capable of producing in quantities to meet stepped up production of pie assembly machine.

No personnel action will be involved as a result of the installation of this pie assembly equipment. It is anticipated that no additional workers will be needed. Those workers involved in manual operations (unskilled labor) on previous equipment will be used on new equipment to keep pie hopper and dough hopper filled, and to clean machine which is a continuous job as long as the machine is in production.

2043 - CEREAL PREPARATIONS - Cereal Coating

This company has been doing cooking and coating of cereal using semi-automatic machinery. A team, consisting of nine workers (4 cooks, 4 mixers, and 1 helper) handled 20 stoves, manual gas fired to cook confection for coating on cereal. The cooks would cook the confection to desired temperature. After cooking, the mixers would cart the cooked confection by hand to the mixing machine, pour the confection into the grain, and mix together to form a coating to produce cereal.

A new machine was installed to replace the 20 stoves. This machine now automatically cooks the confection and automatically mixes the confection to the grain. Where 9 workers were required, 4 are now required. The group affected were the mixers and the company used the bump-back system to adjust personnel. The company tried to absorb the workers in other parts of the plant, such as packing, and warehouse. Normal attrition also helped to avoid layoffs. When this was completed only 8 workers were affected out of a total work force of 90. There were no direct layoffs due to the automation.

2051 - BREAD AND BAKERY PRODUCTS - Bulk Storage

Bulk storage of flour and sugar in tanks (silos) and withdrawing of same to be used in baking of bread as requisitioned by Head Baker.

New Process - Railroad tank car spotted on railroad siding built for plant use only, adjoining plant. Stock Clerk hooks up hoses - tank car to heated storage tank (silos), turns valve-blowing material into tanks and attends to other duties. When tank car empties, usually in one and a half hours, Stock Clerk unhooks hoses and flags tank car for release to railroad yard. Tank railroad car averaging 105,000 pounds of flour can be unloaded in one and a half hours. Previously it took three men six hours.

Old Process - Steps eliminated - after spotting of box car on railroad siding by switch engine, truck driver and material handlers unload individual bags of sugar and flour from box car to truck body. Transport load to plant, manually unload material from truck to Basement storage room. Baker helper and material handler carry or hand truck materials from storage to baking area for processing as often as necessary.

Eliminates truck driver, truck helpers and plant laborers. However, employer indicates absorbing all personnel affected.

2051 - BREAD AND BAKERY PRODUCTS - Bun Making

A small bakery has installed a new bun making machine to replace operations previously performed by hand.

Ready-prepared dough is spread less than an inch thick over a tray about 18 inches in diameter. The tray is then enclosed in the machine, which stands about 4 feet high. It is also known as a bun divider and rounder. The single piece of dough is cut automatically into a number of equal sized smaller pieces each to become a bun. By a fast shimmying process each small piece of dough is rounded into a ball-shaped form ready for further processing. The mechanical operation requires about 15 seconds. The tray is then removed from the machine and the dough balls are spaced by hand on a bake sheet which starts its journey to the ovens.

Previously the buns were formed entirely by hand by a process in which the worker would grab a portion of dough with each hand and simultaneously form two buns by rolling the dough over the table surface under the palm of his hand.

The new automatic process insures that all buns are of uniform size. No workers have been replaced. The owner of the establishment believes it has helped him to better compete with the housewife thus bringing more business and still more employes rather than less.

2052 - BISCUIT, CRACKERS, ETC. - Potato Chip Bagging

This company manufactures potato chips. In recent years they have expedited the various handling processes by different forms of automation.

The most recent change resulted in installing a bagging machine, three of which can be operated by one person. Previously a machine operator tended three machines but required a bagger on each machine.

The chips are conveyed by belt line from Fryer to Packing Machine. A bag is automatically made from a roll of printed paper and the bags filled with weighed portion of chips. The filled bags are sealed and conveyed to a packing table. The speed of packing with this automatic equipment is much faster and results in fewer machines and operators to accomplish the increased production. This special packing equipment is manufactured by Mira-Wrap, Houston, Texas.

2085 - DISTILLED LIQUORS, ETC. - Bottling, Labeling and Packing

The employer is engaged in the manufacture of industrial alcohol, distilled and rectified alcoholic beverages, and chemical by-products. This company recently installed two automatic machines in production lines that perform bottling, labeling and packing operations. Previously these operations were performed manually and only required bottling machines. These bottling machines are now linked with the automatics. Attendants observe and inspect the operations of the integrated machinery. Installation of these new machines increased production from 128 bottles per minute to 200 bottles per minute. The entire operations of these two automatic machines are performed with 20 fewer employes.

Manual operations eliminated in production line: placing empty bottles into filling machine; Handlabeling including bond label, tax stamp and State decal; Capping bottles; Packing bottles in shipping cases; and placing shipping instructions, addresses and other printed matter.

Affected Employes

Company Personnel Director states that the displaced personnel cannot be absorbed in other company operations. Displaced workers will remain on company call-back list, but recall is indefinite.

GENERAL COMMENTS

Automation is bringing about drastic changes in the food processing industries as new automatic processes are introduced to replace manual operations. This new equipment has three distinct advantages:

1. It provides more sanitary operations by eliminating human contact.
2. It increases production as much as 400% in some instances.
3. It reduces labor costs in two ways: by reducing the total number of workers needed and by gaining more production from those who are needed.

Although most of the jobs eliminated are in the unskilled ranks this nevertheless reduces employment potential for the future as the same drastic reduction in production - labor-cost ratio continues. Employment opportunities appear to be limited to maintenance workers who will operate and repair the automatic machinery and a former source of many seasonal jobs appears to be disappearing.

The overall effect of automation in the food processing businesses is illustrated by the fact that total employment within this area declined during the last 10 years from a total of 120,300 workers in 1954 to 114,400 in January 1965.

TOBACCO MANUFACTURES

2121 - CIGARS - Homogenized Tobacco Leaf

This company has been manufacturing a brand name cigar up until June 1961 at which time a new process was introduced into this plant known as "homogenized tobacco leaf" and the manufacture of one of today's best known cigars began.

This new process eliminated the necessity of the stemming department and displaced 35 workers in occupations of wrapper stripper, wrapper weigher, tobacco conditioner and tobacco conditioner and filler. New automatic cigar manufacturing machinery was also introduced for the manufacture of the new cigar. This did not displace workers but created additional occupations of bander, inspector, reject examiner, tipping machine operator and tipping helpers. The job of cigar making machine mechanic was reduced in ratio of one mechanic to 6 machines from one mechanic for each 10 machines for maintenance purposes.

Female employment was reduced from 322 to 295; however, male employment rose from 78 in June of 1961 to a total of 114 at the present time. This was due to technical changes that have taken place since June of 1961.

The installation of automatic cigar making machines displaced workers in one department; however, the homogenized tobacco leaf and the installation of automatic machinery has created other jobs and most workers were absorbed in other occupations within the plant manufacturing establishment.

2121 - CIGAR - Wrapper Layer Machines

This company recently installed new wrapper layer machines which enable 4 women to do the work previously done by 14.

This new process eliminated 30 females from machine operator positions but all remained on the payroll either as wage employes or transfers to a newly created third shift.

Female employment remained the same during the changeover while male employment increased by 10 during the same period.

2121 - CIGARS - Automatic Machines

We have a cigar company in a nearby town at which the demand for maintenance mechanics with experience on light industrial machinery cannot be met. There is a huge demand for a well-known brand cigar which is produced on an automatic cigar making machine. A battery of 6 machines are tended by a Machine Adjuster-II and installation and maintenance work is performed by the Maintenance Mechanic. Lack of experienced workers has necessitated the training of apprentices under an OJT-MDTA program.

The above is cited because it represents a growing demand for skills resulting from an increased demand of a product as well as technological change.

2121 - CIGARS - Wrapper Layer Machines

This company at one time had all cigars rolled by hand (CIGAR ROLLER). However, in 1950, cigar making machines replaced the hand cigar rollers, (CIGAR ROLLER). At present the company has approximately 60 cigar making machines.

The cigar making machine required 4 workers, all female - BINDER LAYER, FILLER FEEDER, WRAPPER LAYER AND FRESH WORK INSPECTOR.

The BINDER LAYER cut the binding tobacco leaves on the suction plates of the tobacco. The BINDER LAYER flattened the leaf and placed it on the plate of the machine and moved it to a new position after the die cut a portion of the leaf. The BINDER LAYER continued moving the leaf until all the portion was used, then placed the new leaf in the plate. She kept the section of the machine cleaned of portions of tobacco leaf. The introduction of "homogenized" tobacco in 1957 deleted the need for BINDER LAYERS on the machines. This tobacco is now made in rolls like brown tape and is fed automatically onto the plates, making the use of BINDER LAYERS superfluous.

The FRESH WORK INSPECTOR checked cigars as they came from the machine for broken wrappers, soft spots, bad patches and wrong length. With the introduction of the wrapper layer machines, few cigars were found to be defective and, therefore, were removed during the inspection process while the cigars were being boxed. The FRESH WORK INSPECTOR job was eliminated.

The FILLER FEEDER placed the filler tobacco in a slot in the cigar machine. The machine then rolled and formed the tobacco before placing the binder layer around the filler tobacco. After each rolling of the tobacco by the cigar machine, the FILLER FEEDER would take the correct amount of filler ejected from a conveyor by her scale and place the tobacco into the slot. The company experimented with automatic procedures for doing this job and in 1960 attachments were placed on each cigar machine and the FILLER FEEDERS that could be assimilated in the plant were placed in other jobs while the remainder in this occupation were released.

Therefore, since 1950 three of the four jobs on the cigar making machines have been eliminated. The only position, at present, on the cigar machine is the WRAPPER LAYER. This worker lays wrapper tobacco leaves on the cigar machine at a specified spot on the plate and smooths the wrapper layer. A die cuts half of the wrapper for use in wrapping the cigars. The worker turns the leaf so that the die picks up the other half for the next cigar. The excess is removed from the plate and the other operation repeated.

Through the introduction of wrapper layer machines, production of cigars has increased by approximately 20%. Because of the increase in production, two stock boys and two receiving clerks were hired. The receiving clerks were hired to handle the "homogenized" tobacco.

Of the employes eliminated (FILLER FEEDERS, BINDER LAYERS, AND FRESH WORK INSPECTORS) some were older women who were satisfied to take early retirement and some women were just satisfied to quit. Some girls were given an opportunity to learn the wrapper layer operation but couldn't do the job and were laid off. Approximately 25% of the present WRAPPER LAYERS were assimilated from the obsolete jobs.

2121 - CIGARS - Automatic Lifts

This company, which now uses a one-girl Wrapper Layer Machine, plans at some time in the future, but perhaps not for a year or more, or until homogenized wrapper layer tobacco has been perfected, to automate the cigar floor fully. This would affect some 330 operators and auxiliary workers throughout the plant.

At this point, the company is installing what it calls an automatic lift which gives the wrapper layer time for more production. It is a mechanical device which lifts the cigars from the machine belt to the press box.

Six new banding and cellophane machines have been installed with about 9 more to come. This machine is used on what is known as 6 packs. It eliminates the necessity of use of the press box because it presses the cigars into shape as it wraps and packs. These machines are being installed in only half of the plant at the time but will be used throughout when plant is fully automated. Cellophaners and Banders have not been affected in any way.

With increased production, more machines will be installed and more people hired. These machines and the additional cigar machines - similar to those now in use - will necessitate use of 2 mechanic helpers in addition to present mechanics. Within the next 3 months, a conveyor belt will be installed to carry and prepare cigars for the cellophane machines. This will cause the plant to need 25 less Packers and Sorters. These people (one-half of Packers used) will be transferred to the examining department. The remaining half will be affected at some later date. The other 25 packers will be transferred to examining or banding. Little training will be required. While this automating is taking place the plant is installing 40 cigar machines which will mean about 120 when all shifts are filled. With the addition of these machines some Packers may be needed until conveyors have been installed.

Recently the plant removed its stemming department to another plant. The 35 people displaced were used as Wrapper Layers, Banders, Cellophaners, and Packers.

GENERAL COMMENTS

The introduction of new processes and equipment in the cigar manufacturing field has gained impetus in the last few years. One reason apparently has been an increased demand for cigars in light of the recent report on smoking and lung cancer.

The introduction of homogenized tobacco and new automation machinery has changed the character of jobs for women workers and appears to be limiting job opportunities for the future. The high rate of turnover for this group of workers has made it possible to absorb many of those affected but entry jobs are disappearing. Instead, there appears to be an increasing demand for male maintenance mechanics who both operate and service the machines.

The present "static" situation is verified by the fact that total employment in the tobacco industry in Pennsylvania had increased from 10,100 in August 1963 to 11,100 in August 1964, and dropped again to 10,400 in January 1965. However, total employment has declined steadily in the past 10 years from 16,500 in 1954 to the present 10,400 - and this decline can probably be attributed to automation and a gradual change in product demand.

TEXTILE MILLS

2221 - BROAD WOVEN FABRIC - Bobbins

This plant manufactures woven fibre glass material for use in drapes and automobile bodies and boats. Formerly the bobbin was wound by the quiller in a separate room and the bobbins were carried to the loom by the magazine filler. Now the bobbins are wound automatically with yarn on the loom by a machine called a unifill tender which also does the quilling operation.

The operator supplies the unifill tender with large spools of yarn and starts the thread ends of the spool into the unifill machine.

Eight magazine fillers and/or quillers were laid off. However, over a period of two years these employes were recalled as unifill tender operators, inspectors, and drapery weaver trainees.

2282 - YARN THROWING, TWISTING AND WINDING - False Twist Machines

This company is in the process of eliminating winding and spinning departments because of the popularity of yarns requiring variety of false twists. Of the 10 coners in the department, 6 have been transferred to other work in the mill-especially false twist machine operators. The 4 remaining are sharing work - working 3 weeks with 1 week idle. This will continue until all of the older type yarn is run out - all orders filled. Twenty Spinners were involved in this technological change. Twelve are still employed while the 8 displaced have been transferred to other departments - Twist Machines, etc., as will those presently employed.

The workers displaced by this change required some training on the new machines. Most of them have been with the company for years and have done many jobs throughout. This has made training easier and of less cost to the company.

GENERAL COMMENTS

This industry is experiencing a severe decline in Pennsylvania. For a variety of reasons, employment has declined from a high of 135,000 in 1950 to 69,400 in January 1965. Some of the reasons are: Automation; geographic relocations; wide acceptance of synthetic materials such as nylon, rayon, orlon, etc.; and extreme competition from foreign countries, particularly Japan.

For example, records (ES-235 forms) indicate that since September 1962 there have been 5 plant closings in this industry with mass layoffs of 100 workers or more in each instance. Competition and relocation were given as basic reasons but failure to automate was also inherent in each situation. Total number of jobs lost through these closings was 739. Another firm automated its weaving department and separated 120 workers.

Job prospects in this industry are poor as automation continues to be introduced and/or geographic plant relocations to automated facilities elsewhere take place.

APPAREL AND OTHER FINISHED PRODUCTS

2311 - MEN'S AND BOYS' SUITS, COATS AND OVERCOATS - New Processes

During the past 5 years, new techniques and attachments to present equipment have been developed to take some of the physical labor out of operations. This has also increased production units per man, per hour. These changes have made some skills obsolete but the people involved have been given some on-the-job training so that their skills could be utilized to do other productive operations. None of these changes have caused unemployment within the industry. Examples of changes are:

1. Hydraulic systems have been developed for pressing machines - used by finish pressers and underpressers (push-button operated). This has resulted in the presser being able to use a lighter hand iron for small pre-pressing operations.

2. Button-sewer machine with shank. This has replaced hand button sewers.

3. Buttonhole machine has been modified so it can do a job that resembles a hand-made buttonhole. Replaces hand buttonhole sewers.

4. Die presser clicker - pre-shaped dies are pressed on single pieces of material to shape complete coat front. Also used to cut out small parts such as flaps and collars. This was formerly a hand operation.

5. Automatic welt pocket machine (inside). This machine makes the inside pocket in men's suits in one operation. This formerly required 5 different operations and 5 operators.

2321 - MEN'S AND BOYS' SHIRTS - EDP for Sales Records

In May, 1964, 27 female clerical personnel were laid off because the IBM equipment in the home office was not being used to capacity. Twenty more females were laid off at the end of 1964. A total of 47 females were affected by the utilization of this IBM equipment.

The jobs eliminated were comptometer operators, stock record clerk, provision clerk, process and shipping clerk, and general clerk. Ten general clerks were recalled temporarily to their old jobs (general clerks) to assist in the final transition to the IBM machine.

Of the 47 girls affected, two were transferred to other clerical jobs in the plant and 7 were transferred to the factory as production workers. Thirty-eight became unemployed.

GENERAL COMMENTS

This industry is automating to the extent that new and improved machines capable of doing more than one operation are being brought into wider usage. However, their introduction does not yet appear to have caused any appreciable unemployment.

The industry has shown a slow yearly growth in total employment. In 1954 227,100 people were employed as compared to the 249,700 in January 1965. Women make up the major part of this work force.

The increase of 22,600 jobs since 1954 has more than offset the 11 plant closings reported (ES-235) in the past two years and which displaced some 1,575 workers. Failure to automate was inherent in some of these closings.

Technological changes and automated clerical techniques will continue but population growth may create enough demand to continue the slow and steady increase in total employment within this industry. However, total automation and/or geographic relocations could adversely affect the present source of relatively unskilled job opportunities for women, particularly in coal mining areas where male unemployment is higher.

LUMBER AND WOOD PRODUCTS, EXCEPT FURNITURE

2421 - SAW AND PLANING MILLS - Logs into Lumber

This company processes logs into rough lumber. This process was previously handled by a head sawyer, his assistant, an edger, and 3 general laborers and production was maintained at a fairly low level. Since automation, however, the head sawyer handles the operation from a power board and has 3 men assist in the handling of the conveyor lines, the lumber sorting machine and lumber piling. Production is now limited only by the ability of the men in the mill to handle saw output. While one man was laid off he was absorbed into another operation started by the company to put excess lumber production to use. They are now manufacturing pallets.

Logs are placed on a chain conveyor by a huge fork lift truck. From this point the action is controlled by the head sawyer at the electronic controls. The logs moving into the Circular Head Sawing Machine are cut and discharged on conveyor lines for edging, if necessary, and for sorting, which is also handled automatically, the edger being hand-fed.

Automation has benefited this company in increased production of raw lumber and an additional enterprise which will help to use up lumber that would normally be stockpiled. This additional enterprise enables the company to maintain their staff without layoff and increase their work force from 15 to 22 full-time workers.

2426 - HARDWOOD DIMENSION AND FLOORING MILLS - Glue Machine

This company cuts and glues wood for furniture and industrial use. Two glue machines were recently replaced by one high frequency electronic glue machine. This operation was to glue pieces of wood together according to specifications before shipment to furniture factories.

The new glue machine reduced the number of men on this operation from 9 to 3. Although 6 men were replaced by this machine, they were absorbed in other phases of the processing since the company is continually expanding.

2431 - MILLWORK PLANTS - Cabinet Finishing

This company is predominantly a manufacturer of architecturally designed cabinets. Because "Bid Peddling" at the contractor level had resulted in inferior workmanship at all levels including painting and finishing, the trend in this industry since 1961 has been to furnish a complete factory-finished, architect-designed woodwork job. This normally would require the addition of many more spray booths and spray finishers. However, this company installed a curtain coater, a machine which automatically prefinishes flat surfaces by hydraulically circulating finishing material. This machine, which is operated by a foreman and several laborers, will do 10 times the work of a spray finisher as well as producing a more superior product. While this automation has eliminated the need for an appreciable increase in skilled spray finishers, it has increased from 10 to 20 percent, mostly of an unskilled nature. No jobs were lost through this automation.

Management feels that the installation of this machine has reduced costs, improved efficiency and the quality of their product to a point where they are able to meet tough competition head-on.

GENERAL COMMENTS

In the automation situations reported in this field the technological changes resulted in increased employment due to expansion of activities made possible by increased productivity. Nevertheless the lumber and wood products industry has shown a steady decline in employment from 17,600 persons in 1954 to 13,800 workers in January 1965.

It appears as if employment may remain stable unless increased use of synthetic materials and light metals for the building industry causes a further decline.

FURNITURE AND FIXTURES

2521 - WOOD OFFICE FURNITURE - Conveyor Lines

This company manufactures high quality wooden desks. Considerable time and effort are spent in applying a high grade finish. Each desk was moved through 3 spray booths and 3 drying ovens by a painter helper, while spray finishers applied coats of varnish. After completion of this process, the desk was placed on a cart and taken to the shipping department on a lower floor of the building. This department utilized 7 men in the DOT classification of spray finisher 7-16.210, 3 men in the classification of painter helper, spray 9-16, one general laborer 8-36, and one foreman, 5-91.511.

An automatic conveyor line was recently installed in the finishing department. This line originates in the cabinet room where assembled, but unfinished desks are placed on the line to begin their journey through the finishing room's 3 spray booths and 3 drying ovens, and finally down a ramp into the shipping room. The speed of the line was geared to allow sufficient time for each desk to be painted and dried. As soon as the new conveyor line was installed, the company was able to eliminate 4 spray finishers, all 3 paint helpers, and the one laborer. Since the skills involved in this operation have no application throughout the other departments of the plant, only 2 workers were absorbed into other jobs.

The skill levels of the remaining jobs are relatively high and, therefore, the employer must go into the open market to secure help rather than upgrade men within the organization.

While employment in this department was decreased over 50%, the overall employment at this firm was slightly increased. The finishing department, formerly a snag in the production cycle, now produces in 3 days the same quantity that formerly required 5 days. As a result, the company has bolstered the work force in its mill room and cabinet room in order to bring the plant to peak production.

Although no new jobs were created in this department, it was necessary to train their maintenance men on the operation of the conveyor line and automatic drying ovens. Management feels that the installation of this automatic conveyor line has reduced costs and improved efficiency to a point where they are in a position to capture a larger portion of the market. This firm forecasts a gradual increase in employment during the next two years as a result of this automation.

GENERAL COMMENTS

This employer also installed new equipment to reduce labor costs, increase production, and improve competitive position. This report illustrates the kinds of personnel actions which take place within a plant when automation is introduced and the nature of jobs changed.

This industry within the State has maintained a stable work force since 1950 with little change during that period.

PAPER AND ALLIED PRODUCTS

2621 - PAPER MILLS - Paper Making

This company is engaged in the manufacture of quality bond paper used in the Printing and Publishing Industry and conversion papers.

During the past 7 years there have been remarkable changes in the production of paper, not only in method but also from the standpoint of volume of output. At the present time there are 7 papermaking machines in operation with a daily output of approximately 300 tons of paper. The seventh machine, installed in 1957, has a top capacity equal to the other 6 machines combined. A new machine, Number 8, is now being installed to be in operation by May 1965. This machine will have an output of 50% of the other 7 machines, increasing maximum output to approximately 450 tons per day.

The large increase in production of these latest machines is due to several factors. First, the machines are capable of running at a much faster speed. Secondly, the new machines make it possible to increase the width of the paper approximately 26 inches, to a maximum of 214 inches. Thirdly, 8 electronically controlled consoles help control the complex processes of these high speed machines, and different grades of paper can be produced without stopping production. On older type machines the various stages of papermaking are individually controlled through a series of switches on an electrically operated switchboard.

Manpower requirements did not change drastically with the installation of Number 7 and Number 8 machines. Five men operate each machine, the same number needed on the older machines. However, there is a decrease in the number of employes required in the Furnishing Department where the bleached pulp is hydrated, beat and mixed with other ingredients to prepare "furnish" for making paper. For example, in the Beater Room, which supplies "furnish" to Number 1 and Number 2 machines, 12 men are employed. On machine Number 7, 2 men are required: a stock preparation operator and a helper. When Number 8 machine is completed only 1 additional man will be required. The 3 men will prepare the stock for the 2 machines.

The installation of machine Number 7 in 1957 and machine Number 8 in 1965, is a part of an extensive expansion program and is not expected to result in unemployment. In fact, in the next two or three years, employment is expected to increase by approximately 125 people. The increased production is necessary to meet the demand for paper resulting from population growth.

Approximately 25 of the new 125 jobs will be created when the pulp mill operations are changed. At the present time the pulp is refined through a series of tanks or batches until it is ready for stock preparation. The new pulp mill, which will be built in the near future, will be a continuous digesting operation. In this process, pulp will be fed into the machine and finished pulp, ready for stock preparation, will be processed on a continuous operation. This is comparable to the Oil Refining Industry where crude oil is refined to various degrees in one complete operation.

As part of the expansion program, an off machine coating machine will be installed. This machine will be used to apply the various additional coats of material to paper for specialized use. Approximately 50 additional people will be hired for this coating and finishing operation.

2621 - PAPER MILLS - Quality Control

A local paper mill, one of the largest in the country making fine quality papers, has been introducing improved processing procedures and the use of automatic equipment to meet the competitive challenges of this industry. The firm first introduced an improved quality control system in the paper finishing operation. This consisted of the use of a special light in the inspection of the first two inches of paper on each roll. This is done by the operator in the paper rewinding operations when transferring the paper from the metal machine roll to a heavy paper roll.

The initiation of this step permitted the further processing of the roll paper through the Lennox Converter Machine which cuts the paper directly from the rolls into specified sizes. This eliminated the precutting of paper into untrimmed sizes before the final finish cut of business size papers (8 1/2" x 11" and 8 1/2" x 14").

Two additional improvements in the processing of shipment orders consisted of the use of the Southworth Automatic Packing Machine which automatically wraps and glue seals packages (instead of tape), and the introduction of an improved Hayssen Packing Machine which automatically wraps, seals and labels packages ready for shipment.

All of the above steps have resulted in slight reduction in employment and included only limited female separations -- all affected male personnel were assigned to other tasks. The outstanding factor of accomplishment was the decided increase in production and the improvement of quality as a result of the innovations installed.

2641 - PAPER COATING AND GLAZING - EDP Control

This company has installed an IBM 305 and related equipment. All personnel concerned were retrained and kept on in new jobs created by the IBM system. In addition, two new jobs were created and resulted in new hires. No one was furloughed or demoted. Occupations affected were in manual clerical operations.

GENERAL COMMENTS

Automation situations reported here tend to result in increased employment through expansions made possible by automation. The industry itself shows a slow but steady increase in employment of 4,200 jobs since 1954 when 38,100 workers were employed as compared to 42,300 in January 1965.

Population growth and continued automation will probably maintain a stable work force in this industry.

PRINTING, PUBLISHING AND ALLIED INDUSTRIES

2711 - NEWSPAPERS, PUBLISHING - Linotype

There is a new development in the setting of type by using automated linotype machines.

By the old method, linotype operators set type directly into the linotype machine. The speed of the operation was not effected so much by the proficiency of the operator but more by the process involved in converting molten lead into type.

The new method uses a standard linotype keyboard but the equipment punches a paper tape. The tape is then taken to a standard linotype machine on which there is an automation attachment. The punched tape operates the linotype.

Setting type on the tape machine is almost three times as fast as setting type directly into the linotype machine.

But more important than the saving in linotyping local news is the tremendous saving in linotyping national news service releases received from the Associated Press, United States International, and other news services.

Under the old method the local newspaper received national and international news by teletype. The teletype tape was given to the linotype operator and he set the type.

Using the new automated equipment the teletypewriter both types and punches the tape. Therefore, news received from the national news services goes direct from the teletype to the automated linotype. By this procedure one operator in the news service headquarters transmits news that is received in a large number of newspapers. And it is received on tape that is both typed and punched for direct use on the automated linotype equipment.

The number of linotype operators can be reduced by 30 to 40 percent and still maintain the same amount of lines of print. Each newspaper, however, will try to retain all employes.

This new automated equipment was installed in a local newspaper during the past three years. The effect of this equipment was considered by union and management when a contract was negotiated. By agreement, news is transmitted by the wire services on combination teletype-linotype punched tape. However, syndicated feature articles such as Earl Wilson's column and Ed Sullivan's feature are not transmitted on linotype punched tape. Therefore, each newspaper linotypes syndicated features.

2732 - BOOK PRINTING - Tape Controlled Typesetting

In order to handle an ever increasing volume of printing work this plant is in the process of changing to tape controlled typesetting. By means of an attachment, a perforated tape is fed into a linotype machine which produces 6 lines of type per minute as compared with the 1 1/2 lines by the present method.

The tape for these machines is made by tape perforator machine operators. The worker operates a keyboard of the tape perforator machine to copy data from manuscript onto tape for producing automatic type composition. He secures a roll of tape in machine, makes necessary adjustments, then depresses keys on keyboard to punch tape. He then removes completed roll of tape for delivery to a computer. The computer then justifies the tape as to correct work spacing, etc. The tape is then removed from computer and fed into attachment of linotype machine which then sets the type automatically.

The new operation is presently used on the third shift for smoothing out operations. The four linotype operators will be replaced with one worker who will operate all 4 linotype machines which have been adapted for tape typesetting. The 3 linotype operators will be absorbed in the collator or proofreading room. Eventually all shifts will be geared to this new operation.

Since production will be increased four times, it is expected that many additional needs will be created in other plant operations. The company is presently erecting a new building to house their tape perforating, computers and paper back binding operations.

2751 - COMMERCIAL PRINTING - Offset Press

A local printing company has installed a new automatic offset printing press by the trade name of Mann Perfecto, which was made in England and cost $100,000.

They put the press into operation the middle of September 1963. This press replaced three of their former presses. The change involved three employes who are now being trained on other jobs in the plant. Two of their other employes are being trained to operate the new press.

The information submitted previously indicating that two additional men would be needed, has now been changed by the employer who states there will be no change in total personnel.

2761 - MANIFOLD BUSINESS FORMS - Continuous Process

This firm has, for a considerable period, operated in the printing field with the principle products being various types of printed business forms. Certain types of forms are prepared on a custom basis in accordance with specifications provided by the purchaser. Other forms, of a standard nature and used extensively throughout the business world, are printed on a continuing basis. Multiple carbon paper forms represent the principle product.

The original equipment in use consisted of one Dutro Roll-To-Sheet Press which employed one operator and one catcher. Additional items of equipment included two Menedez Spot Gluer machines. Two operators were required for the Spot Gluer machines. In addition, six hand binders were used as a part of the crew, making a total operating force of 10 employes.

This is a highly competitive field with a profitable operation based on high production, as the profit per unit is comparatively low. In order to retain its competitive price status, this firm purchased 3 automated Dutro Roll-To-Roll continuous process presses. The addition of this equipment necessitated the purchase of 3 collators, required as part of the integral operation. Thus, the addition of automation equipment led to the hiring of 3 Dutro Roll-To-Roll operators and 3 collator operators.

The installation of the new process eliminated the necessity for 6 hand binders. However, the firm retained these individuals and trained them for employment as catchers on the collators.

In conjunction with the operation of the new equipment, the firm found that it could still profitably retain and operate the original Dutro Roll-To-Sheet Press and the 2 Menedez Spot Gluer machines, thus being able to retain workers employed in these operations.

The high speed increased productive capacity and low cost operation of the new automated equipment enabled the firm to seek new business and extend the market for its product. Eventually this resulted in the establishment of a second shift to fill all orders received. Through the retraining and reassignment of the 6 hand binders whose jobs were eliminated, the firm has been able to use them in other operating positions.

Thus, the automation of the major phase of operation resulted in no overall decrease in personnel, even on an immediate basis, and, due to the addition of a second shift, has eventually resulted in increasing total employment from 17 to 28 workers.

2789 - BOOKBINDING AND MISCELLANEOUS WORK - Collating

This company has installed automation in their Collating and Gathering Department. As a result, the quantity of material to be collated has been increased. There were 6 collating machines installed.

Previously, this department operated with 15 women performing collating and gathering by hand. With the installation of these machines, a greater volume is produced with 6 persons operating them.

This firm did not lay off any personnel due to the installation of the automation as they absorbed these people in other departments.

With the collating machine, the operator sits instead of stands and is able to feed the machine by push-button control, and collates by foot control. Material collated is taken from the machines by hand and stacked on tables mounted on casters. Tables are then wheeled to the conveyors and the material is placed on the conveyor belt for delivery to the Binding Department. Little training time is required to learn how to operate these machines.

2791 - TYPESETTING - Computerization

The gross earnings of this company have been declining for several years. Methods of operations were reviewed and a number of changes are being made due to high cost of labor, inability to get qualified workers due to 4 to 6 year training period required, and the present age of workers (50 to 70 years) with no provisions being made to replace them.

Within the next 3 to 6 months, an IBM No. 1620 computer will be installed. This will permit typing onto a punched tape which is then fed into the computer memory system. A programmer and a typist will give an end product ready for the Photo-Composition Machine which in turn will make a place for offset or gravure printing.

The firm presently employs 75 persons and it is felt that 15 will be retained. Occupations still needed will be:

Programmer
Typist
Converter and Photo-Composition Man
Maintenance Mechanic for Photo-Composition Machine
Proofreaders (reduced number)

Occupations no longer needed will be:

Linotype Operators
Hand Compositors
Pressman (other than offset)
Foreman
Bookkeepers (computer will prepare statements)

The company feels that this automated process will produce in one hour the amount of work that was produced in 24 hours under the old method.

The employer feels that competition will force the entire industry to convert to computers within the next 2 to 5 years.

GENERAL COMMENTS

The impact of automation is being felt deeply in this area. There is evidence that EDP equipment, tape controlled and fed linotype machines, new automatic offset presses and collating and binding machines are causing some highly skilled crafts, such as linotype operators, pressmen, hand compositors and hand book binders, to become obsolete.

Disappearing also are the apprenticeships that have long been a trade-mark of the publishing industry. These changes seem to be gradual and no significant unemployment appears to have occurred inasmuch as no mass layoffs have been reported in the past two years.

General employment in this industry is not rising in the same ratio as production seems to be. Population growth would require greater quantities of published materials yet employment has increased only 3,400 - from 60,400 in 1954 to 63,800 in January 1965. Automation appears to be causing internal changes and it seems logical to assume that job skills will continue to be reduced as more technological change occurs.

CHEMICALS AND ALLIED PRODUCTS

2818 - INDUSTRIAL ORGANIC CHEMICALS - Computerization

This large company has an IBM unit with the major machine system being the IBM 1401 Ramac. All payroll, production scheduling and inventory control is accomplished through this system. All the workers who formerly performed most of this work by hand on less sophisticated office equipment were retrained on the job or at IBM facilities and retained. In addition, specialized occupations were created and new hires resulted due to the equipment installation.

This company also has an automated plexiglass manufacturing machine which does in one continuous operation what used to be done by various machine operators and laborers. The workers displaced by this operation were retrained for the new operation or absorbed in other areas of the plant. With the exception of the technicians who control the operation, the skills necessary to tend this equipment are now lower than those required of the old process.

2834 - PHARMACEUTICAL PREPARATIONS - Miscellaneous Machinery

This pharmaceutical laboratory manufactures various pharmaceutical preparations such as nasal sprays, cough medicines, suppositories, etc.

The company is spending one million dollars on automatic machinery, physical layout on present building, and an additional building for expansion purposes. Automatic equipment will be installed in the old building to speed up the production lines. Automatic tableting machines will be installed for Bayer aspirins, a new addition to their products. The plant will be closed down for approximately one month, starting December 26, in order to move present operations to the new addition, after which automatic machinery will be installed in the old building. Employer stated changeover will not involve specific occupations. Present mechanics will be trained on the high speed machinery by the manufacturer of the machinery. New operations will be at the same level of skill. Employer stated plant employment would be greater but was vague as to specific totals - stated possibly 300 to 400, or perhaps as high as 500. Present plant employment is 218. Hiring is to start on a limited basis by the end of January with majority of hiring to be done in June.

2834 - PHARMACEUTICAL PREPARATIONS - Bulk Handling

Another pharmaceutical laboratory in the area manufactures insecticides, germicides, medicinals, disinfectants, vitamin and protein concentrates for poultry and animals and veterinarian supplies.

A contract was signed in October to install bulk handling machinery. Their former method consisted of removing the material from railroad cars in kegs and carrying the kegs to the mixing machines. New methods will consist of emptying the material into bins from the railroad cars and pushing buttons to release the material from the bins into the machines. One present employe will be trained by the plant superintendent on this job which they tentatively call "programmer." This changeover will take place in the spring.

Employer feels this position will be of a higher level of skill. He stated the equipment will not affect total employment but will stabilize work and provide more steady employment as they will be able to increase their sales since they will be able to increase their production.

2842 - SPECIALTY CLEANING AND POLISHING PREPARATIONS - Bottling

This company specializes in the manufacture and packaging of silicone polishes and cleaners for metal, leather, and other products. They include in their operations products manufactured by them and also those purchased elsewhere in bulk lots, which they package in 16 ounce bottles for resale.

This company started with 5 employes with a hand operation on their filling and packaging line. As the demand for their products increased, they added additional people but soon found that their hand-operated filling equipment was inadequate to meet production requirements. To bring production up, they invested in an electronically controlled and operated automatic bottling machine.

Following is a comparison of the hand operation and the bottling machine:

Type	Employes Required	Cost	Production
Line Spigots	20	$ 300	2,800 - 16 ounce containers daily
Automatic Bottling Machine	14	30,000	25,000 - 16 ounce containers daily

As the summary shows, production capacity for bottling was almost nine times greater as a result of the machine installation and 6 fewer employes were needed. The original line bottling process was slow and required unskilled help. With the automatic filling process, most workers now are engaged in filling cartons and handling the shipping of products.

The employer indicates that the installation of this machine, which initially meant a decline in employment, will, in the long run, require more employes than would be needed with the old hand method of filling bottles. The additional daily production has enabled the employer to compete better in the market, and sales are increasing to such an extent that it may be necessary to add an additional seven persons to the payroll in the near future to meet customer demands.

GENERAL COMMENTS

The automation described in this industrial group seems to indicate that little or no displacement of workers is taking place. Computers are being installed to improve recordkeeping and supervise production needs. New machines for preparing and bottling chemical products have generally resulted in an increase in employment due to the large increase in demand and subsequent production.

Over-all employment has shown slight fluctuations at various times but a slow increase is evident from the 51,400 employed in 1954 to the present figure of 55,500 in January 1965.

This is a highly competitive field and more companies will turn to automated processing equipment in order to retain their positions. However, since chemicals are so important to modern manufacturing processes in many industries, the future outlook for job opportunities in the area appears to be bright.

RUBBER AND MISC. PLASTICS

3011 - TIRES AND INNER TUBES - Curing

This industry is primarily engaged in the preparation, building, and curing of raw rubber and other compounds to manufacture rubber tires and tubes. The curing department has been modernized with 10 new curing presses that will increase production up to 50% over the old machines. It also reduced the number of men needed to operate this department from 9 to 3 men.

The operator of the curing presses,called Pot Heater Tender, can operate 5 of the new machines at one time. Before this it required one per machine to meet maximum production quotas. The Pot Heater Tender on the new machines must keep a supply of unmolded tires on hand by carting them from the paint department. The new machines run on a curing cycle from 22 minutes to 56.5 minutes. When the cycle is completed the machines reload the molds automatically with mechanical feeder arms. After the unmolded tires are placed on the baggers they occasionally need adjusted or repositioned, and operator detects them by visual inspection. If the tires need adjusted the press is turned off manually and the operator positions the tires with a crow-bar, and turns the machine on to complete the cycle. Reloading of the feeder arms is done by the operator who physically lifts two tires from the curing presses and positions them on predesignated floor markings for the feeder arms to pick up. The machine is now ready for another cycle.

The company will engage in other areas of production upon completion of its expansion program. At present the company is experimenting with the rubber coating of stainless steel rolls used in extruding light gage metal.

As a result of automation in the curing department 6 men were released from their duties in the curing department. However, they were utilized in 3 other departments because of the increase in production. Two men were placed in the paint room at no cut in hourly rate, and 2 men were placed in the inspection team at the same rate of pay. The other 2 men were given employment in the experimental department which up-graded their pay rate classification.

Due to the increased production methods, the company has started an on-the-job training program for maintenance mechanics. They have also started an on-the-job training program for future management positions that will eventually arise through automation.

GENERAL COMMENTS

The usual effect of the installation of automated equipment is substantial reduction of labor costs with a sharp increase in total production as reflected here. In this instance, 3 men now perform work formerly done by 9 men and with a 50% increase in production. Fortunately, increased production required the services of the 6 affected workers elsewhere in the plant.

This industry has shown a slow but steady increase since 1954 of from 17,500 employes to 22,900 in January 1965.

LEATHER AND LEATHER PRODUCTS

3141 - FOOTWEAR, EXCEPT RUBBER - EDP for Mail Orders

This company manufactures plastic footwear.

Approximately a year ago, this employer had a total of 24 employes to process individual direct mail orders received for their product. Upon receipt of the order, the mail order clerks would record, or extend by hand, all data needed for each order. The record then would be given to the bookkeeping machine operator to record the information in the company's sales journal. During the peak season, it was necessary for the company to hire additional temporary help to assist in processing the orders.

Because of the large number of temporary and full-time employes needed to process these orders, the company decided to install an IBM system which includes the processes of key punch, tabulating, sorting, interpreting, calculating, collating, reproducing, and verifying. The company was then able to reduce its direct mail order staff from 24 to 12.

The installation of the IBM system made the following changes in this operation:

1. Upon receipt of a direct mail order from the customer, information containing necessary data, which is needed for each sale, is keypunched on an IBM card.

2. The company was able to maintain an up-to-date inventory control of all manufactured products according to style, size and color.

3. The IBM system eliminated the use of a bookkeeping machine operator. The IBM card contains a record of the company's total sales year to date in terms of dollar value; also, in styles, sizes and colors of the products sold. It maintains a record of sales per state, sales tax breakdown, and a computation of the commission on sales paid to salesmen, and a record of sales by each individual salesman.

4. A more accurate recordkeeping is made available to management. In the past, approximately 5 department heads were contacted to develop an individual breakdown, through hand counts, which were needed to prepare these reports.

Of the 12 employes that this operation eliminated, some were utilized in other departments; 2 of the mail order department workers were trained for the IBM occupations; and, through normal turnover, only 4 employes were separated.

This company stated that this operation is beneficial to them because it reduced the need for temporary workers normally hired during their peak season and a continual year-to-date report is available on all sales and inventory of manufactured products.

Management has been able to receive reports faster and they can be obtained from one source, instead of 5 or 6 sources which were needed in the past.

3141 - FOOTWEAR, EXCEPT RUBBER - Cementing

This company employs approximately 850 in the manufacturing of a low cost women's casual or sport shoe in the $5.98 price range. The company is being caught in the price squeeze, as the cost of material, wages, etc., are continuously rising while the price they can get for the finished product remains the same. The only way to minimize these effects is to cut down labor costs through machinery improvements.

At present they are in the process of perfecting a cementing machine to attach the uppers to the lower part of the shoe. When the "bugs" are all out, it should replace 5 hand cementers. The company would hope to absorb these workers in other jobs if they are adaptable.

3142 - HOUSE SLIPPERS - Lasting and Cementing

This company manufactures ladies' house slippers, casual shoes and play shoes. Recently the company installed 10 automatic toe lasting machines and 1 insole cementing machine to cut production costs, increase production and save space.

Previously this operation was performed by 3 puller-over machines and 18 toe lasting machines. The new automatic machines combines both operations thus eliminating the puller-over operators and decreasing the number of machines required from a total of 21 to 11.

These changes have made the puller-over machine operators jobs obsolete and reduced the number of toe laster machine operators needed. However, those operators involved who have been displaced by this operation have been retrained in other plant operations and there has been no overall reduction in plant personnel.

GENERAL COMMENTS

This is a highly competitive field which has remained static in total employment with only a small increase of 2,100 employes since 1950 despite a tremendous increase in population and a commensurate demand in the product.

The introduction of synthetic materials and automated machines and processes may cause employment to decline.

Computers will reduce labor costs significantly in administration areas and cause a related shift in employment.

The tanning industry appears to be on the decline with the introduction of man-made synthetic materials, plus high cost of hides and raw materials.

STONE, CLAY AND GLASS PRODUCTS

3211 - FLAT GLASS - Numeric Control

This firm produces flat glass of varying dimensions and thickness. Several actions have recently been taken in one of its plants to reduce costs and increase production. The net effect thus far has been an increase in both production and employment, though the latter may decline when additional automated equipment is installed.

The most effective single change, instituted with the cooperation of the union, was the shifting of the shipping department personnel from day rates to production incentive rates, with no change in processing. The 25 men saved in that department were shifted to manufacturing.

The changes to be effected through automation are only beginning. Prior to December 1962 the plant had operated one glass melting tank, batch for which was mixed by hand by a batch mixer on instructions from the chemist. This tank supplied and fed into 9 Forcault machines through which the glass was rolled to a given dimension and thickness and was scored automatically for breaking at specified lengths. Dependent upon width of the glass, each machine was served by one or two BREAKERS who broke the glass off and transferred it to a buck (rack for vertical stacking) which in turn was moved by a motorized truck to a storage area.

Recently, a second, but much smaller, tank was added which supplied two machines. At the same time, both this and the larger tank were equipped with automatic loading and batch mixing machines operated by electronic tape. The BATCH MIXER was retained but his responsibilities were essentially to observe the automatic equipment for faulty performance. The one BATCH MIXER handled both tanks, thus conserving one man per shift.

The small tank was also fitted with "J" Machines, locally developed, which automatically break the glass at the score points and, using suction cups, place the glass on a conveyor belt, at the end of which it is removed by hand and placed on bucks as before. Some savings are effected through the elimination of need for sweepers to keep the broken glass cleaned up. No changes were made at the machine end of the large truck. Over a 24-hour period, the following staffing is required for 2 tanks:

Large Tank (9 machines)

Breakers - 46
Relief --- 6
Utility -- 3
Truckers - 6
Sweepers - 3
Checkers - 3
67

Small Tank (2 machines)

Top Floor Men - 3
Cranemen ------ 6
9

The new equipment could only be installed with union agreement because it represented additional employment, leaving the status of the big tank crew unchanged. Further automation, including the installation of automatic cutting machines to perform most of the work of the highly skilled GLASS CUTTERS is in the experimental stages.

3221 - GLASS CONTAINERS - Forming

Until July 1962, this company was engaged in the manufacture of glass containers, and used production machinery similar to the four other glass producers in the area. The company is unique in that it is the only one in the area that produces amber bottles. In July 1962 a fire destroyed approximately 3/4 of the installation including 3 of the 5 glass bottling machines. Prior to this incident the company employed between 130-150 people and had in operation 4 Lynch and 1 IS glass forming machines.

The old Lynch machines were circular single feed, four section types. Four individual sections revolved around the single feed and at maximum production required 2 operations and 3 maintenance men for a 75 bottle per minute output. Down time on the machines was very extensive because of their excessive years.

Gradual replacement of the Lynch machines by a new vertical, six feed, six section, IS machine has taken place. Whereas the old type could only produce a single bottle per section, the new IS produces two bottles per section with a maximum production of 130 bottles per minute. It requires only one operator and two upkeep men. Less time is required to anneal the bottles and rejects have been reduced by 30%.

There are presently 188 employes due to an increase in selectors, packers, and warehousemen brought about by increased production. Surplus machine operators have been absorbed within the company and retraining has been of little issue. Management feels that when the final Lynch machine has been replaced an additional 8-10 selectors will be needed and points out that in this instance automation has increased employment.

3229 - PRESSED AND BLOWN GLASS - Capping

During the past year further technological change has reduced manpower requirements at this plant of a nationally known glass company.

The newest innovation is a Christmas Tree Ornament Capping Machine that compresses the spring to the steel clip and inserts the clip and the cap assembly into the ornament neck. Some use has been made of this machine in previous years but it was not until the last few months that it was used so extensively as to make much impact on manpower requirements.

This year about the same number of workers were used as in previous years but the year's production was gotten out in about six weeks less time than formerly and in the neighborhood of 50 workers laid off about six weeks earlier than in former years. This year production ran from late January until the first of October. Usually these workers have been laid off late in November.

3229 - PRESSED AND BLOWN GLASS - Blowing

This company manufactures electric light bulb blanks and Christmas tree ornaments.

The change here reported has been gradual in its application and probably reached its full impact at least two years ago. The company reported has produced electric light bulb blanks on highly automated machines since the 1920's. These machines replaced hand blowing techniques. When the machines were put in operation, a large number of inspector-packers picked up each bulb blown, examined it, rejected it by throwing it into a cullet return, or packed it by hand in a large cardboard hamper. The technological change has reduced the need for inspector-packers by about 200 workers and reduced the annual peak of employment from about 800 to 600.

The perfection of many separate techniques has resulted in a reduction in the number of imperfect bulbs blown so that it is possible to allow the bulbs to run off the inspection lines into the packing hampers almost without inspection. The hampers are random packed by machine where the bulbs are sifted with a lubricating powder and vibrated into a tight pack when the individual hampers are sealed and ready for shipment.

This process results in some shipping breakage and the packing of some imperfect bulbs but the lamp manufacturers are permitted to keep tally of the broken and imperfect bulbs and receive proper rebate credit. Even if a considerable percentage of bulbs was rejected by the customer the company's loss would be considerably less than the cost of hand inspection and packing. It may be presumed that the lamp manufacturing customer who buys the bulb may have a slightly additional labor requirement in disposing of the imperfect bulbs.

3241 - CEMENT, HYDRAULIC - Electronic Control

The establishment involved is a local plant which manufactures Portland cement. This company has for several years been operating two separate mills, one to grind "slurry" to make cement and the other as a finish mill, with a complete staff of operators for each mill. They make both grey and white cement, with a capacity of approximately 1.5 million barrels of grey cement per year and 750,000 barrels of white cement.

They have been building a new mill for white cement, as well as remodeling existing facilities so that all operations can be controlled from one central point, an electronically operated control room. This change is responsible for reducing the number of mill operators and firemen from a total of 18 to 4.

Previously, 8 men (on a 2-shift basis) were required to operate the "raw mill" to grind "slurry" as one of the first steps in making cement 8 men were required to operate the finish mill or pulverizer and 2 men worked the mill, observed thermometers, gages and other equipment to insure proper functioning, also lubricated the equipment.

Under the present setup, all operations, from the moment the partially crushed rock from the quarry enters the raw mill until it is ready for the bagger, are completely automatic. Every step in the milling, drying, etc., process is observed on electronic boards in a central, air conditioned control room where a total of four men, in shifts, can set in motion the raw mill, the finish mill, conveyors and drier. If there is malfunction in any part, a light flashes on, a button is pushed, the malfunctioning part is stopped and all steps in the process leading up to that point are also automatically stopped. After the cause of the malfunction is ascertained and corrected the operators restart the mills.

The installation of these automatic controls replaced 14 mill and drier operators. Reduction in personnel took place at the end of July. Because of union seniority agreements, the persons terminated were not necessarily the employes whose jobs were discontinued. Four of the latter were upgraded to the new positions in the control room, while some of the remainder were given the opportunity to "bump" workers with less seniority from certain other jobs.

3241 - CEMENT, HYDRAULIC - Conveyors

This manufacturer of Portland cement produces about 3,500,000 barrels a year. They are in the middle of a ten to twelve million dollar rebuilding program that should be completed by 1966.

At the present time the company is operating part of the old plant and processes and part of the new so the production situation is rather confusing.

Two new raw and finish mills are in use with a capacity greater than the 4 raw and finish mills they have replaced. This part of the operation has done away with 20 1st and 2nd millers and 12 helpers.

New conveyor systems have been installed that feed the rock to the primary crusher, surge silo, secondary crusher, and screen. The coarse screened rock is conveyed back through a Williams reversible grinder for regrinding. These systems are all controlled from one control center.

The Miller controls the conveyor from the bins to grinding mill, raw mill, slurry tank and correction tank. Slurry is then fed through the 2750 degree kiln and then through the cooler that forms the clinker. The clinker is then conveyed to the clinker storage bins. Clinker is then fed to the finish mill where gypsum and other additives are combined and pulverized. The finished cement is then conveyed to storage silos.

A new twelve-yard overhead crane has been installed in the new storage building where clinker, shale, sand and mortar stone are stored. This large crane and shell operates two turns and requires only two operators. This system replaced 12 men used on the old conveyor belt operation.

When the building program is completed all systems and operations will be controlled from four control points in the new plant. No change has been made as yet in the packing department, but this operation is expected to be completely automated and the pallot system made full use of instead of the present partial use. The number of men that will be affected by this change is not known now. Plant is operating with about 40 less employes than one year ago and no temporary help was hired last summer to cover vacations.

3262 - VITREOUS CHINA TABLE AND KITCHEN ARTICLES - Miscellaneous Machinery

This company has been producing vitrified hotel china and dinnerware since 1909 and, until the past 10-12 years, has been making chinaware by the centuries-old methods used by skilled craftsmen.

Foreign competition forced this progressive company to experiment with automatic jiggers and cup makers. The six-head automatic jigger using 3 men to feed and operate has replaced 15 hand jobs requiring 30 jiggermen and batter outs on flat ware jobs. Only 6 hand jobs are still used for special ware and short run items that are not profitable to set up on the automatic jigger.

All flat ware is still trimmed, sponged, and finished by hand, and the ware is still taken off drying conveyors by "take offs" and moved by board movers.

A cup making machine has been developed that produces 950 dozen cups a day with 2 operators. As in the case of the flat ware production, only 3 hand jobs are now needed for special dinner ware and short run items. Each hand job requires 4 men. These hand jobs only produce about 350 dozen cups a day.

The decorating departments have been affected by new processes. Much of the decal decorating has been displaced by color spraying and a new silk screen process, although 40 decal decorators are presently employed. A stamping process has been made operative in the print decorating department that replaces some hand decorators. This process requires only two girls, one to feed ware on a conveyor and one to take off and stack in ware buggies.

Production by this method is used for long runs of flat ware and decorates about 320 dozen a day. Hand print decorators produce about 20 dozen a day. Forty-three hand decorators are still employed.

Fast fire decorating kilns that feed and take off ware automatically have displaced kiln placers and drawers.

Accurate figures are not available for the changes in employment caused by automation in this plant as production cannot be compared to the peak employment of 3,350 employes in 1948. Employment averaged 1,274 between 1953-1959 and then dropped to the average of 1,062.

3264 - PORCELAIN ELECTRICAL SUPPLIES - Transfer Devices

Ceramics Department - Automated transfer device under development; at the pressing operation where an operator loads a firing setter tile, it is expected that the loading can be done by a mechanized device. The part produced is a small alumina ceramic wafer which is loaded on the setter tile in a quantity of 80 to a 5" x 6" tile. These presses are Dry Presses, are automatic, and operated by female personnel. Currently, there are four Die Presser machines and four female machine operators on the operation (one operator for one machine).

If the process is developed, it is hoped that increased production would utilize any persons displaced as a result of mechanization. It is expected that the automated process will reduce the operator requirements in relation to the number of machines to be operated per person, i.e., two operators will operate two machines each. The two operators involved in the disappearing jobs will be absorbed in other job openings which are expected to occur as a result of increased production. These jobs will consist of Service Girls, Stackers, Table Girls, Car Loaders and Unloaders, etc. These positions already exist in the plant, but the type and quantity of openings cannot be determined until the process is further developed or at the completion stage.

There is no indication that there will be any newly created jobs resulting from this automated process. However, it is intended that, if the development is successful, additional machines will be installed. This will result in need for more operators and probably additional feeder-type jobs, as noted previously (Service Girls, Stackers, etc.). The additional machine operators will be obtained from employes who have been with the company. Any resulting new hires will start in the entry positions which have been vacated by those moving up to the machine operator position. The project is not expected to affect the industry as a whole, inasmuch as they will not apply for patented rights. The reason for this is, the company is of the opinion that if they do not apply for a patent, the process will not be disclosed, whereas, if they do apply, the process may be discovered by their competitors. The company desires to preclude access of the development to competition.

These improvements are now in planning stage. It is intended to install the automated operation as soon as it is proven successful. A conjectured date for possible completion of the project is early 1965. This depends entirely on the success of the planning, development, and application of the transfer device.

3271 - CONCRETE BRICK AND BLOCK - Continuous Process

This company is engaged in the manufacture of concrete building blocks with primary market in the New York City metropolitan area.

Until June of 1961, blocks were made on three separate units performing different phases, by 24 employes on two shifts, producing six to seven thousand blocks daily. A Russ Ferre Automation System was installed during 1961. Cinders and cement are fed into one end, the machine selects the proper amount of both, mixes with metered amount of water, feeds mixture into portion of machine that forms blocks. Blocks are then ejected onto conveyor which transports them into live steam room where they are cured in eight hour circuit. The above process is all done automatically by one operator who observes control panel and progress of machine.

An average of ten thousand blocks are now produced daily on two shifts and delivered to New York City markets. Employment has increased to 35 persons due to increased production and competitive pricing resulting from installation of the new machine. Positions eliminated were absorbed by positions created in transfer, storage and shipping of increased production.

GENERAL COMMENTS

This entire major industry group shows a steady decline in employment since 1954 when total employment was 74,100 workers to the present level of 62,400 in January 1965. The highest level of employment was 81,000 workers in 1951. The decline falls into two major categories: glassware, glass containers, flat glass and vitreous china; and hydraulic cement.

In the glass production area, new automatic machines are being installed to reduce labor costs and increase production in the manufacture of flat glass and glass containers. At the same time, there has been a tremendous increase in the use of glass containers, particularly in the pharmaceutical and food processing industries. Flat glass production has also increased commensurate to new car production.

In the hydraulic cement industry, employment has declined steadily since 1940. For example, employment in the Lehigh Valley alone (principal producing area) has fallen from 4,500 workers in 1940 to 2,400 workers in 1964. Four plants have closed since 1960 with a loss of 875 workers. Reason for shutdowns was competition, high labor and shipping costs, and a shift in market locations.

For instance, in 1946, cement plants in the Lehigh Valley manufactured approximately 20% (33.3 million) of the 166.4 million barrels of cement produced in the United States. Since that time, competition from plants outside Pennsylvania, coupled with continued increases in labor and shipping costs, have forced the local industry to reduce the cost of cement production. This has been accomplished through modernization (automation) of existing facilities and the relocation of plants (new automated facilities) closer to the changing cement market.

In 1963, the national output of cement was 353 million barrels. Of this total, approximately 10% (35.3 million) was produced in the Lehigh Valley. As measured by volume of production, the local cement plants were manufacturing approximately the same amount of cement in 1963 as they were in 1946, with 47% fewer workers.

(Note: Data on employment, volume of production, and plant shutdowns were provided by the office of the United Cement and Gypsum Workers Union, Easton, Pennsylvania.)

PRIMARY METALS

3312 - STEEL WORKS - Oxygen Conversion

This manufacturer of alloy silicon steel products (one of the larger steel firms) is in the process of building a "pilot unit" of a multi-million-dollar basic oxygen converter steel plant at its present location. If the process can be successfully applied to the company's products, largely in the stainless steel field, then the next step will be to construct a full-scale basic oxygen converter steel plant. It is not known at this time how this will affect the employment situation.

3312 - STEEL WORKS - Vacuum Furnace

Another manufacturer of high alloy tool and die steel is in the process of building a new metallurgical laboratory and vacuum furnace for producing high temperature alloy steels. The furnace went into operation sometime in October 1963. The company does not know how this will affect their employment situation. This company also installed one automatic grinder, and expects to install another Midwest Automatic Billet Grinder. This machine is expected to replace six or eight men.

3312 - STEEL WORKS - Degassing Process

This company has, until recently, used the same method of degassing as other large steel producers in the area. A large percentage of the steel produced is used locally to produce Seamless Tubing. In their quest to improve steel quality and reduce total cycle time, the new million dollar Degassing Unit was developed to produce ultra-high quality steels. This conversion process consists of a car-mounted ladle in which molten steel is placed and passed through a vacuum degassing chamber. This degassing unit was built by the Stokes Corporation of Philadelphia, Pennsylvania.

The degassing chamber is roughly a box 16 ft. wide by 17 ft. long by 21 ft. high. Access doors are located on either end and permit the steel to enter through one side, get degassed, and emerge through the other.

A five-stage steam ejector produces the extremely high vacuums. An induced magnetic field, generated by induction coils mounted on the ladle car, stirs the steel to expose all the melt to the vacuum. The coils connect to a power supply when the car is in place. Because of faster steel handling, this industry degasses 90 to 100 ton heats in less than 33 minutes, with temperature losses in the vacuum chamber held to 50 to 60 degrees Fahrenheit. (Over 99.99% of air is exhausted from the chamber.)

The installation of this degassing unit replaces the old method of using overhead cranes. The displaced overhead crane operators can easily be utilized in same capacity in other departments of the plant. At this stage, it is not known what other occupations will be affected and what processes will be eliminated or instituted as result of this new unit.

Presently the operation of the new unit is being done by the trained staff of the Stokes Corporation (the builder) until about the first of January 1965 at which time the firm visited will have to take over full operation and maintenance responsibility.

The new degassing unit may require special training of electronic technicians, special maintenance men, and other skills which may be required. It is believed that the skill factor will supersede the seniority factor in order to facilitate full production of this new unit. Every effort will be made to use present employes. However, management feels as an insurance against production lag, new hires with skills necessary will displace some of the present staff.

Retraining for electronic technicians will be a problem for this firm and MDTA program was discussed to meet this demand.

At this time, the employer could not advise what effect on employment this new process will have. However, local E.R.R. will follow up with employer about early February 1965 and submit supplement to this report.

3312 - STEEL WORKS - Time Keeping

This manufacturer of seamless tubing for gas lines and oil lines recently changed the method of time keeping for hourly workers.

Previously there were 12 clock stations at which each man selected his time card, punched in at the beginning of the turn, and punched out at the end of his shift. During the course of the shift, a timekeeper collected the cards and computed the hours for the previous day, then sent the condensed report to payroll for computation weekly.

Under the new system, guards at the plant entrance give each employe a time card as he enters the plant daily. The card is given to the foreman who stamps the cards with the employes' check number, occupational code (job code), and hours spent on the job. At the end of the turn, the employe picks up his card and returns it to the guard as he leaves the plant. The cards for all employes are sent to a central place and then forwarded to the Integrated Data Processing Center in Pittsburgh which handles the time cards for all the plants of this firm in the area.

Under the old system, the firm had approximately 48 employes as timekeepers. These men have been reassigned to other jobs as a result of the new system.

The same firm has recently opened a new multi-million dollar Electric Resistance Weld Mill which is completely automated. The new mill will turn out line pipe ranging in size from 8 5/8" to 20" outside diameter.

At this plant, coiled steel is fed into a machine (in a continuous operation) in which it is rounded, welded, inspected, ground and labeled in lengths up to 80 feet. The plant employs approximately 150 men who were transferred from other jobs in the firm's old plant and trained on-the-job to operate the complex mechanized machinery.

This firm for years has produced pipe with an old electric weld process where steel plates cut to size were formed, and welded by machine welding, hand ground and hand chipped to remove excess weld deposits, then expanded under water pressure to the desired outside diameter. In this manner, pipe up to 36" O.D. was produced up to 24' lengths.

The old method will not be abandoned completely as it will still be used to make pipe with O.D. of 21" to 26" which cannot be made in the new Electric Resistance Weld Mill.

The technological and automated changes mentioned above have not resulted in any loss of jobs. In fact, it has provided jobs for some men who have been furloughed for a long time. These men are replacing those who successfully bid on jobs in the new mill.

3312 - STEEL WORKS - Plant Modernization

This firm is a division of a national corporation. In late September 1964, the president of the corporation announced that the firm will build an anhydrous ammonia plant in the area. They also will build new coke oven gas processing facilities. It is expected to have both facilities in operation late in 1966. The ammonia plant will have a capacity of 400,000 tons a year. The new gas processing system will be a cryogenic (low temperature) process. The corporation president said the installation of the low temperature gas processing unit will result in production of anhydrous ammonia, an improved, dry de-sulphurized coke oven gas, and increase the recovery rate of light oils from which benzene, toluene and xylene were produced. It is expected that the new plant will employ between 150 and 200 people. The firm declines to say at this time in what categories these people will be employed.

3312 - STEEL WORKS - Open Hearth

This corporation announced a broad scale plant improvement program on June 30, 1964. They refer to this program as "Project 600" which calls for an investment of $600 million during the next 6 years. Plant improvements and additions are in various stages of design or engineering for both domestic and overseas operations. While advanced programs are underway in Middletown, Ohio; Houston, Texas; Ashland, Kentucky; Kansas City, Missouri; and Butler, Pennsylvania, more than 470 acres have recently been acquired adjacent to the main plant for additional steel making facilities. A new melt shop (open hearth) is presently under construction at the main plant site and will feature the most modern advances in melting technology, along with vacuum degassing and continuous casting units. The present plant with its 6 open hearth furnaces and an electric melting furnace is rated at an estimate of 50,000 tons a month. As the project is completed, it is expected that the plant's capacity will replace the open hearths now in operation. Major areas of operations impacted by the new changes are melting, slabbing and maintenance. There are currently about 4,000 workers employed here.

The conventional method of producing steel entails tapping the heat, pouring (teeming) molds, transportation of molds, stripping molds, re-heating and processing ingots through forming rolls into sizes and shapes required for semi-processed steel for market. The continuous casting process will eliminate slab and bloom mill operations and their attendant operations. It provides for the processing of molten steel from a furnace tap to semi-finished products in the form of channels, beams, strips, etc.

Company officials state that there are many problems to be worked out, but there is the possibility this new process may quadruple present capacity.

Company officials state further that while publicity released by the company is encouraging, workers in some departments have already been informed that their jobs will no longer exist. Departmental seniority prevails at this plant. Indications are that, after overall expansion has been completed, this project would probably not increase overall employment. Expansion plans of the company are intended to keep the organization competitive in the steel market, but overall, it will protect their total employment figure of about 4,000 workers. Job requirements involved in these newer processes and operations will require potential and skills unlike those being displaced. Company felt new needs would require high school graduates with physics and chemistry background. This plant prefers to train and upgrade its personnel and normally does not hire skilled workers from the open market.

3312 - STEEL WORKS - Oxygen Conversion

This firm is one of the smaller firms in the steel industry. In addition to the operation of basic steel making facilities, the firm fabricates various consumer items including tubes, fences, wire, nails, and steel construction materials. Due to limited resources, the firm has experienced difficulty in operating profitably in a highly competitive field.

In order to enhance its competitive position, it was determined to install 2 Basic Oxygen Converters at an approximate cost of $17,000,000. The oxygen converter process, by increasing production with the expenditure of fewer man hours, was expected to curtail production costs and enable the firm to meet competition from larger companies in this industry. Operations were initiated in January of 1964.

The Basic Oxygen Furnace or Converter installed consisted of 2 vessels, each capable of producing 150 tons of steel every 60 minutes. Currently, it requires approximately 140 workers to handle this operation. Normally, 50 operators, 50 stockmen, a varying small number of laborers and the required maintenance personnel, as electricians and mechanics, are employed.

The firm had previously operated as many as 11 open hearth furnaces, although during normal situations, the number in operation averaged 9. Each open hearth furnace could produce approximately 20 tons of steel per hour; thus, the number usually in operation varied from 7 to 9. Total employment of melters, first helpers, second helpers, third helpers, laborers and maintenance personnel usually averaged about 530.

The initiation of the Basic Oxygen Furnace operation reduced the number of open hearth furnaces required to 2 or 3 used only for stripping operations on ingots. Employment in this operation was reduced to about 170 melters, first helpers, second helpers, third helpers, laborers and maintenance personnel. The Basic Oxygen Furnace workers were recruited from the group of 360 displaced. In addition to the decrease in the number of skilled personnel utilized, a substantial reduction in the labor force of approximately 100 workers was affected. Full operation of the open hearth furnaces had required a considerable crew of unskilled labor to handle such duties as handling supplies, patching and moving materials.

The initiation of the Basic Oxygen Furnace process required an increase in the number of Blast Furnaces operating from 1 to 3, with a consequent increase in the number of employes involved from 80 to approximately 240. Skills involved here were furnace chargers, furnace keepers, first helpers, second helpers and third helpers, with increased requirements for supervisory and maintenance personnel. Individuals displaced as a result of the reduction in open hearth operations were transferred to this section.

Firm officials state that, despite increased productivity at a lower cost in the steel making process, the installation of the Basic Oxygen process has not, as yet, adversely affected employment. This has been due, in part, to the continued high level of production in the steel industry, enabling the firm to absorb all workers displaced from open hearth operations into other operational areas. Firm officials feel that savings in production costs, which will improve their competitive position in relation to the steel market, will eventually enable them to avoid heavy curtailment of their labor force during future fluctuations in the demand for steel, and thus, assist materially in stabilizing the local economy.

3312 - STEEL WORKS - Oxygen Conversion

A steel company announced changes and improvements in their plant March 17, 1964. Operation of a pilot oxygen converter was disclosed. A program of melting in this unit established the suitability of the basic oxygen process to the special metals produced by this company. This unique piece of equipment is known as a hot blast cupola. Since this company does not have a blast furnace, it has adopted the hot blast cupola as a means of producing up to 1,200 tons of hot iron per day for the oxygen unit. There is only 1 other such unit in the United States. This will improve the company's competitive position in the steel industry. The company plans to train their present employes in the operation of this new unit. No increase or decrease in the work force is anticipated as a result of the installation of this new unit.

The company recently acquired 223 acres of prime industrial land as an expansion site. This new land will enable the company to install river front dock facilities for handling barge load quantities of scrap iron and alloy metals.

Other recent technological advances in steelmaking-like continuous casting and pressure teeming -- also are in this company's future. This will require still further evaluation and development studies for adaptation to the kinds of special steel that the company makes. This company also announced that it is consolidating all of its activities in the cemented carbide field -- powder metallurgy is one of the hardest substances known -- into another company with headquarters in Pittsburgh. All this comes under an $80,000,000 capital improvement program.

3317 - STEEL PIPES AND TUBES - Continuous Weld

Subject company manufactures butt weld pipe of various grades and dimensions from 3/4" to 6" diameter. Changes installed consist of a conversion from the tong and bell system to a continuous weld mill. The finish departments in which sizing, galvanizing, threading, inspection, etc., are accomplished, were relocated but not appreciably changed.

The bell and tong system used strips or skelp of proper dimensions according to size of pipe being produced. The strips were heated in furnaces, removed by tongs and placed on scarfer rolls that bevelled edges and then attached to mechanical tongs which pull the metal strips or skelp through a bell or series of bells that form and accomplish the butt weld. There were about 20 jobs of an unskilled nature associated with this process such as furnace hands, poke-up, charge-up, hook-ups, tong take-off man, tong carrier, welder, bell carrier, bell cleaner, rollers, bench hands, etc.

The continuous mill process differs from the bell and tong system in that coils of dimensioned steel are much greater in length. A loop floor is the area used to weld the ends of the coils together prior to entry into the furnace which is considerably longer than the old type furnaces and in line with mill as a continuous skelp or strip is heated and passed on to the rolls that skarf, shape and weld the strips into pipe. The cutoff, threading, finish, hot dip and inspection departments are at the end of the mill. There are basically 4 job titles associated with the continuous mill operation, namely: mill operator, roll setter, end welder and skelp feeder.

Under the bell and tong system, it required 30 men per shift. Using the continuous mill system, it now uses 8 men per shift so that on a 3-shift basis, there is a reduction in manpower from 90 to 24 men. The old lines are still operable and new lines have been in the process of "debugging," and, as of now, ready to roll.

In August, approximately 50 unskilled employes were furloughed - most of these men have less than one year of seniority. For the past several years, employment has varied between 329 in January and February to 395 in June and July. The company is the last manufacturer in the United States, disregarding specialty shops, to convert to the continuous mill process. Tonnage per man hour and quality of product improvement will enhance the company's competitive position.

3323 - STEEL FOUNDRIES - Automatic Heating

This Steel Foundry is engaged in the manufacture of carbon, low alloy, pump casings, valve bonnets, car wheels and various other castings.

A new central heating plant was installed in this foundry and put into operation the last week of September 1964. This plant houses two 250 H.P. Cleaver-Brooks, model CB package boilers, which are combination oil, gas fired. This automatic heating system replaced 4 stokermen. These 4 men were transferred to other jobs in the plant. Employer stated they were placed in "jobs commensurate with their skills and abilities."

Early this year this same foundry installed semi-automatic shell molding machines which replaced the hand operated shell molding machines. This process enables the same operator to produce two to three times as many molds as previously produced. This changeover did not require any additional training. Since this new process increased the number of molds made, 10 additional mold cleaners had to be hired.

In 1962, this foundry installed a new process of "pressure pouring." This process is a refinement of the previous process which consisted of conventional hand pouring using a Hand or Bull ladle. The new method consists of the placing of the ladle of molten metal over a pressurized chamber to pneumatically force the transfer of metal from the ladle to the mold without exposure to the atmosphere. The employer stated the purpose of this change in methods is not to mass produce but to produce a higher quality. This change in methods did not affect their employment and did not involve retraining. A larger unit will be installed sometime in 1965.

3323 - STEEL FOUNDRIES - Continuous Casting

This company presently is using the conventional practice of steel making which involves several time-consuming and expensive operations. In order to be more competitive and give customers quick service,this industry is installing a new continuing casting machine.

Continuous casting is a new development in the steel industry, to be used primarily for the production of stainless steel slabs.

It involves pouring molten steel into a bottomless water-cooled mold where it solidifies and comes out in a continuous strand. In this new facility, there will be 2 strands which may be varied in size up to 10" in thickness and 52" in width.

Casting speeds of up to 55" per minute, per strand, will permit a full 180 ton open hearth heat to be cast in less than one hour.

This company has a turn-key contract with Huber, Hunt & Nichols, Inc., of Indianapolis, to design, construct and place in operation the facility which is of the type developed by a German group, Demag-Mansesann-Boehler, who will furnish, design and engineer operator training and start-up know-how.

The new facilities, expected to be in operation by late next year, are of the curved mold type, covered by concast patent.

At this stage, the employer does not anticipate an increase in employment since it is their practice to shift employes from discontinued lines to new facilities.

3351 - ROLLING, DRAWING AND EXTRUDING BRASS - Plant Modernization

This firm, which has been engaged in the manufacture of extruded brass rod from preheated billets, has recently relocated and assembled 3 brass rod mills which were housed in separate buildings into one building, together with the 3 extrusion presses.

The changes effected have resulted in abolishing 3 positions. These positions were referred to Pull Out Men whose job was to pull out billets from the preheated furnaces prior to placing them in the extrusion presses. These billets are now automatically ejected by the Extrusion Press Operators.

The firm is now in the process of expanding and modernizing their Parts Department which is expected to change and affect other positions. As modernization progresses, management will inform the Bureau of Employment Security as the process changes take place and their effect upon current positions.

The 3 men involved as Pull Out Men have been transferred to other positions in the company.

Retraining of personnel to date has been no problem. Electricians were sent to school of the companies which are installing new presses to learn how to properly maintain systems in good operating order.

3352 - ROLLING, DRAWING AND EXTRUDING ALUMINUM - Numeric Control

This fabricator of aluminum will be replacing its present Univac II Electronic Computer, with a Univac III. The installation of the new unit was made in November 1963 and operations began in January 1964.

An educated guess is that there will be 30 to 40 people displaced. It is not yet known how many will be shifted to other duties or laid off. It will be more than a year before the unit is fully absorbed into the present operation, and the full impact on the employment picture will be known. They do not expect to be needing any new positions, because of this change. They expect to have their present programmers and supervisors trained by the company installing the machine, in a series of 6- or 8-week courses. These people will, in turn, train the other employes on the job.

3361 - ALUMINUM CASTINGS - Shell Core Machine

Making cores (sand) for aluminum and brass castings for molders.

New Process - A dependable shell core machine installed to make cores for molders which will make a complete and solid shell core in one operation. Operator selects proper metal core box and inserts it in machine and operates valves and levers to blow prepared sand into box heating material at same time to form complete and solid shell core. Operator times heating process, (averaging 40 seconds), releases valves and levers to remove shell core, and places shell core on table for immediate use.

Old Process - Employe selects shell core or dump box and installs same on bench or floor. Prepares inside of box for core removal, packs and rams prepared core sand solidly into core box using shovel, hands and tamping tools and removes box from core. Prepares resulting core for removal to pasting room for processing to baking oven for hardening.

No definite elimination of labor. Surplus time of personnel assigned to other operations. Old process required coremaker working 8 hours to keep molder operating 8 hours. New process requires only 3 hours to keep molder operating 8 hours.

New process will make complete solid shell in one operation eliminating making half cores and pasting them together before hardening process. It eliminates pasting shells or cores together and resulting waiting period to dry. Also eliminates oven baking of 3 to 4 hours.

Size of molds - New operation maximum for this particular machine: 16" x 30" x 10". Old operation - Maximum 60" x 36" x 30".

3391 - IRON AND STEEL FORGINGS - Carbide-Tip Tool

This manufacturer of hardened forge work rolls decided during the late 1950's that the newly created Carbide-Tip Tool could be very beneficial for reducing machine facility hours on roughing machine operations.

The manufacturer requested the assistance of carbide-tip tool manufacturers to apply their product to machining operations and invited the engineering staff of all interested carbide tip-tool manufacturers to visit his plant, view their machining operation and produce a tool capable of speeding up the machining operation. As a direct result, new carbide tip-tools began to replace the former high-speed tools on the roughing operations of such products as roll bodies, journals and in such processing as parting operations and opening bore holes for trepanning. By comparison, machining work which normally would require 50 hours in that shop with high speed tools was reduced to 20 hours utilizing the carbide tip-tools.

By example, a reduction of 30 machine hours per forged work roll on an average of 90 new work rolls produced each month resulted in a reduction of 2,700 machine man hours per month. Although there were no work force reductions during the busy period, this innovation enabled the manufacturer to accept and produce more orders with the same machining facilities.

Recently, when orders for cold reduction mill work rolls diminished, this innovation reduced machinist manturns (8-hour shift) an average of 123 per month on a basis of 22 turns per month per machinist. This resulted in 5 machinists being classified to lower rated positions, formerly held before attainment of their journeyman status. A further curtailment was imposed on the apprenticeship program for skilled machine hands due to the introduction of this product and its application to machining methods.

GENERAL COMMENTS

New steel making processes indicate far reaching effects on occupations and employment in this industry during the next decade. For example, 3 large steel making firms alone have launched capital investment programs totalling $698,000,000 to be completed in the next six years.

Primary among new processes mentioned are the basic oxygen conversion furnace, a new degassing process, a new continuous weld mill to produce steel pipe and tubes, and continuous casting in steel foundries.

All these processes are designed to increase production through improved facilities and lower labor costs by requiring fewer employes to operate these new facilities. In one instance 140 workers in an oxygen conversion furnace produce as much as 530 workers did in the older open hearth system.

Employers generally hesitate to give information regarding the number of jobs eliminated by automation. However, the ES-235 mass layoff reporting procedure shows that 2,408 permanent separations have occurred since September 1962. Of these 2,408 layoffs, 1,953 jobs were in seven plant closings. Competition from more highly automated and competitive firms no doubt contributed to these closings.

Overall employment in the primary metals industry in Pennsylvania has declined from 280,100 in 1950 to 249,400 in January 1965. This steady decline in total employment, coupled with the known high capital investment programs of the major producers,is a good indicator that automation is having a profound effect on present and future employment in this basic industry.

3496 - COLLAPSIBLE TUBES - Plant Modernization

This company, until a few years ago, has been doing finishing operations on collapsible metal tubes using hand operations. Three of the steps involved are trimming, coating and painting, and capping. Each step is listed separately. In these 3 steps, only females are used.

Trimming

The old method consisted of the worker placing the tube on the machine, then, with a hand, pressing bar which activates the cutting blade to trim the nozzle of the tube (such as one used for toothpaste). The worker then removed it and placed it on a conveyor belt for further processing. During the past 2 years new automatic machinery was introduced and installed. Previously there were 12 lines, 1 worker to a line, 2 shifts, doing this hand operation. Presently there are 9 new machines installed with 3 doing the hand operation.

Future plans call for 11 automatic machines and 1 hand operation. The automatic machinery feeds itself from a conveyor belt, places the tube in the proper position, and trims the excess from the nozzle, and replaces it on the conveyor belt for further processing. One hand operation will be retained due to some of the sizes and/or amount to be processed which would not be profitable or possible to do by machine.

Coating and Painting

Formerly the worker placed the tube, by hand, on a spindle on a slowly revolving drum. The drum revolved and as it did, it dipped the tube into a chemical solution to coat it and paint it. Then the tube was removed, by hand, and placed on a conveyor belt for further processing. New semi-automation machinery was installed about the middle of 1962, where the machine feeds itself from the conveyor belt, and places it on the spindle on the drum. The worker now only removes it, enabling faster production.

At present, there are 2 semi-automatic machines installed (12 lines), leaving 10 lines still doing the hand operation. Present plans call for all remaining 10 to be semi-automatic. A new machine is being studied which is fully automatic. If this machine is found feasible, then the whole operation will be automatic, eliminating all workers doing this type of work.

Capping

There are 12 lines, 2 workers to a line, 2 shifts. (Total 48.) Formerly, caps were placed on these tubes by hand, twisted and tightened. A new automatic machine was installed in the middle of 1963 which automatically feeds itself from the conveyor belt, places the cap on the tube and tightens it, then discharges it back on the conveyor belt for packing operations. This new automatic machine replaces 2 girls. Also, semi-automatic machinery was installed. In this operation, the worker places and starts the cap on the tube, places it on the machine and holds it, the machine then tightens it. This is a very fast operation.

Present plans are for 4 more automatic machines to be installed within the next year. However, at least 1 line will be retained as a hand operation, since the amount or size of tube to be processed will not be economically feasible on the machine.

On all of the forementioned operations where automatic machinery is installed, there is a set-up man used to set up the job, depending on the size, and other factors in the processing of these tubes. Usual set-up time is one to 3 hours. Where a small run is needed, the hand operation will be used since it would not be economically feasible to set up the large automatic machinery.

Since the new machinery has been and is being installed, the company has been working closely with the union in setting up a retraining program for workers affected. This retraining program will take in other operations where automatic machinery is not contemplated. All workers are encouraged to take advantage of this retraining program. Workers are also encouraged to learn all the jobs in the plant. In case the company decides to mechanize other sections these workers will have had some experience on other operations where they would be able to fit in. One problem has arisen due to this technological change. Formerly, on the 3 operations mentioned, the workers were paid on the piece work or incentive basis. On a lot of the other operations, there is no incentive or piece work rate; all straight time. Negotiations have been and are being made to solve this problem with the union.

Employer has not laid off any workers as a result of this technological change but is using usual turnover and not replacing any workers. The total number and occupations affected are: Trimmers - 11; Coaters and painters - 12; Cappers - 12-18.

3499 - FABRICATED METALS - Continuous Process

A manufacturer was faced with the problem of economically mass-producing perforated steel pipe hangers in a highly competitive market. Standard production methods required 3 operations: (1) A press operator to perforate steel strip; (2) A shear operator to cut the strip into prescribed lengths; and (3) A tender to run the strips through a machine to coil and fasten each strip separately. Continuous operation required 3 employes.

The company developed and installed a machine(s) to perform all of these functions and produce the same product in one continuous operation. One operator can tend this new machine, which, by operating at a more rapid and sustained rate and by the elimination of material handling time, out produces the former standard method by 100%. With this installation manpower requirements were reduced by two-thirds while actual production was doubled for each operating machine. If production requirements demand it, one operator can tend 2 of these automatic machines.

An operator of the newer machine must be of a higher skill level, must have more mechanical knowledge and comprehension than any worker under the previous production arrangement. He exercises judgment in knowing when dies require adjustment or need to be replaced, must lubricate and tend the machine, be able to stop it in case of a jam, cut out and remove the jammed strip, refeed the steel strip through the machine, and resume operations. The operator is not required to change the set-up of the machine.

Two of the 3 occupations replaced would be at a Feeding-Offbearing level. In this particular instance there has been no reduction of force resulting from the installations, as workers have been absorbed as replacements and into other operations of the company.

GENERAL COMMENTS

This industry has had a slow but steady decline in total employment from 116,300 in 1954 to 105,000 for a net loss of some 11,300 jobs in January 1965. Whether this decline can be attributed to increasing automation or change in product demand is not evident by the information at hand.

However, the mass-lay-off reporting procedure shows that since September 1962 there have been 2408 permanent separations. Included in this are 3 plant closings affecting 1054 jobs. Two mass lay-offs, totaling 1252 workers, could reasonably be attributed to automation. One was an obsolete plant closing and the other the discontinuance of a product no longer in demand.

MACHINERY, EXCEPT ELECTRICAL

3532 - MINING MACHINERY AND EQUIPMENT - Numeric Control

This employer has been primarily engaged in the manufacture of mining machinery for the past 45 years. Competition is very keen in this industry, not only in the primary product, but also in replacement parts.

Tape machines were introduced mainly for 2 reasons; to replace worn out and obsolete machines, and to keep competitive in the market. This objective will be achieved by less man hours and more efficient shop methods. Presently, this company has 6 tape machines doing production work, 2 more are about ready for use, and 4 are on order. The following tape machines are now in use: 3 drill presses, 1 turret lathe, and 2 horizontal boring machines. Tapes are prepared on a flexo-writer by a female operator from a programmed schedule. This schedule is prepared by a technician from a blue print. The tape is first punched on paper and tested in shop to determine its validity. If tape is correct for machining operation necessary, a plastic tape is punched, which can be used over and over again, and stored for future use. As the company machines many thousand parts for its products, this library of tapes becomes very valuable. The programmers are skilled machine shop personnel who have been given training by the tape machine manufacturers in various seminars.

The advantages of the tape machines to the company are many. Machine operators will not require the high degree of skill they formerly needed, and they can operate 2 or 3 machines. One set-up man can supervise several machines. Set-ups are easier, as the blueprint will show the tools needed and the centering point for the first cut only. The possibility of human error is greatly reduced, and the need for inspection is practically eliminated after the first piece is produced. The need for tool designers and jig makers will be reduced as more tape machines get into production. Actually the change-over will result in more white collar and less blue collar workers. The degree has not been determined as yet.

3566 - MECHANICAL POWER TRANSMISSION EQUIPMENT - Automatic Press

In order to hold the profit margin in the manufacture of pressed powder metal products, this manufacturer was forced to automate. Reason - increased costs of raw materials, labor and price competition in the industry.

This company manufactures bearings, shafts, gears, etc. Dies are used in 15 to 50 ton Hydraulic Presses to form parts. In the past each machine required a female operator (classified as Laborer) to insert the powder mix in a hopper that would feed to the die assembly automatically. After the item was formed, the operator would stack same in trays. The clocking meter of parts produced would be checked frequently to stop the machine after the required number of items were made.

The company, after many months of design and engineering, developed a new automatic press which did not require an individual operator once the dies were set. Continuous filling of die molds and tray stacking was automatic. The machine would stop afterreaching the pre-designated number of parts to be produced. Under this new process, a male machine adjuster (classified as a Machine Adjuster or Die Setter) could set up and operate 4 machines at one time. Thus, 3 female laborers would be eliminated from each machine over the 3 shift period.

In the past, a male machine adjuster was used to set the dies. However, due to the expansion of this business and the demands for many new intricate parts to be made by the pressed metal process, it was necessary to make a change in the type of operator used for this purpose. The mechanical set-up of the new type press required a person with complete mechanical background and skill. (The set-up man follows order specifications in setting dies; uses all types of hand tools; checks pressed products with micrometer to check on I.D. and O.D. tolerance allowances. Upper and lower dies for forming presses have to be fit and adjusted to form items and hold to very close specified tolerances.) Under the new system, the set-up man would be operating 4 presses and would be occupied setting-up and changing dies on 1 of the 4 machines continuously.

The first of the new automatic presses was put in operation in March of 1964. To date, a total of 6 are in operation and, within a year, all remaining presses will be automated. Engineering and working models for automating other operations in the manufacture of pressed metal parts has been developed and will require male set-up employes to operate the machines; thus, replacing female workers in the same ratio of the automatic presses. (Management was reluctant to release information of other contemplated changes at this time.)

Although this company employs approximately 45 percent female workers, they have discontinued hiring females. As the transformation to automation increases, the work force will consist of male employes with the exception of office personnel. The 18 females, displaced by the introduction of the automatic presses, have been assigned to working in other departments for the present time.

It is reasonable to predict that workers, who are terminated through the use of automation, will be placed in similar industries in the area where automation has not been introduced, as yet.

This particular company will employ graduates of the Local Area MDTA training course in Machine Operation scheduled for completion in the near future. Graduates will be used in the machine set-up operation on the automatic equipment. A second MDTA course of this same type will be proposed with the intended date being the completion of the present course. Purpose: To satisfy the future needs of this company for operation of the automatic equipment already installed and, also, for the equipment which will be introduced in the future.

3569 - PARTS FOR ATOMIC POWER PLANTS - Merging Operations

Automation in this plant has not displaced men because of the highly skilled and technical nature of their work. They have always been highly automated and ahead of other industries in the use of exotic metals, etc. As a matter of fact, they are now cutting down on the use of sub-contractors to do their work. This will not only insure the employment of their present personnel, but could mean additional hiring and an increase in efficiency. Subcontractors may, however, find it necessary to reduce forces.

3591 - MACHINE SHOPS, JOBBING AND REPAIR - EDP Control

This employer operates a "job shop" engaged in engraving, metals and plastics machining, sheet metal fabrication, and plastics forming. Within the past 6 years the plant has increased in size from 5,000 square feet to 17,000 square feet due to its "branching out into fields of various machining, sheet metal fabrication and plastics forming." This required the installation of new equipment. Two new machines were purchased, one a Pratt and Whitney Tap-O-Matic drilling machine and the other a Friden Flexowriter, an electronic data processing machine.

The Flexowriter located in the office is used to collect cost data. This is supported by 2 auxiliary in-put transmitters in readily accessible locations in the shop.

Standard data is punched into edge cards by the Flexowriter from information contained on a "slave tape" and the job order. These punched edge cards accompany each job order to the shop. At the completion of each job the employe inserts the punched edge card into the transmitter and dials variable information concerning the completed job. This includes such items as the employe's and machine identification numbers and the number of pieces completed. This data combined with the standard information on the punched edge card is received in the office on a Friden Selectadata and punched into a continuous tape. This tape contains a daily record of all production activities in the shop. At the end of each working day, the tape is taken to a Business Supplies Corporation (located in the immediate area) and converted into punched tab cards. These are sorted and then printed on large printers and returned to the employer in a ledger type, loose-leaf folder. At a glance, the employer can obtain machine loading reports and time study data.

The acquisition of this equipment has placed the concern in a greater competitive bidding position and has increased their job contracts enormously. Conversely this equipment did not displace any personnel, but did result in the hiring of 1 new man and the reassignment of 2 girls to full-time work in the plant.

Prior to the installation of this automatic machinery, these 2 girls from a production department worked on a "whenever you get a chance" basis to collect data which took up to 3 months to complete.

The use of this equipment has enabled the employer to quote more realistic job prices based on prior cost experience which is now readily available. The ability of the employer to quote job prices based on accurate recent job cost information has placed him on a more favorable cost estimating basis. This in turn has secured, in a very competitive market, many additional job contracts.

3591 - MACHINE SHOPS, JOBBING AND REPAIR - Numeric Control

Company does jobbing machine work on all types of metal, ferrous and non-ferrous mild stainless steel down through exotic metals. Approximately 8 years ago, due to ever-increasing business, they started to install Werner-Swazey automation chucks on their turret lathes. This work was completed approximately one year ago and has resulted in vastly increased production on the cutting and shaping of metal parts.

No personnel were laid off due to this change but within the year 4 additional turret lathe operators were hired as volume or orders increased.

3591 - MACHINE SHOP, JOBBING AND REPAIR - Numeric Control

Plant installed automatic numerically controlled drill presses to replace semi-automatic, relieving one man per machine. People affected were absorbed in other functions, having no effect on employment but increasing production.

3599 - MACHINERY AND PARTS - Power House Facilities

On October 20, 1964, a new plant was announced for this area. This plant when it begins operation around the end of the year will produce a new invention which is a Gravity Power House utilizing Kinetic energy, and the pressure of gravity dynamically applied to produce power-gain torque. In simple laymen's language, the power house produces electricity without the conventional use of coal or oil and will operate any conventional A.C. or D.C. generators.

The firm expects to employ 120 to 150 people, most of them being electronic technicians.

Since this is a new invention only general information regarding what the Gravity Power House will do is being disclosed at this time by the firm.

GENERAL COMMENTS

This industry has had a static work force since 1954 with only a slight increase of 900 workers from 123,300 in 1954 to 124,200 in January 1965.

A significant advancement, however, is the development of the computer for numeric control which enhances the production, operation, provides automatic quality control and reduces costs through increased production with fewer rejects and fewer people. There are indications that numeric control may eventually effect skilled workers in the machine trades and cause changes in apprenticeships common to the industry. However, this will probably occur over a long period of time since numeric control is still in its infancy and requires large capital investments. As is usual, competition will be the greatest promoter of its accelerated application, since few firms can long survive the cost-ratio of craftsmen's high wages coupled with equipment fast becoming obsolete.

ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES

3642 - LIGHTING FIXTURES - EDP for Accounting

This company has a large accounting department employing automated equipment--IBM 632's and related auxiliary equipment. All billing, inventory, payroll, and sales are now done on these machines rather than by hand. Changeover resulted in transferring workers involved in these hand operations to new jobs using machines. Net result was an increase in jobs. Machines were installed so that more work could be accomplished and work could be done that formerly took too many man-hours.

In addition, this company has installed an Automatic Randsburg Electro-Static Spray Paint Unit. Installation of this equipment resulted in a lay-off of 10 air spray painters.

3652 - PHONOGRAPH RECORDS - Automatic Presses

One department was reduced by 90% due to automation. No net loss of jobs due to increase in business and method of production.

Company has 10 automatic extruder presses, 1 operator for 2 machines. Additional machines may be added; however, they are still experimenting with the ones in operation and they are not at full production. Agreement must also be reached with union as to how many machines can be operated by one employe.

This could mean the loss of 18 to 20 employes as press operators. However, additional press mechanics and electricians would have to be hired.

3671 - RADIO AND TV ELECTRON TUBES - Testing

This company discovered that costs in the Testing Department were running excessively high due to manual testing. A research program was undertaken to determine a new method that would automate the testing of radio tubes, reduce costs, and increase production. After 3 years of engineering, designing, and experimenting, 4 automatic testing units were put into operation in April 1963. These machines were designed and built by company personnel. The adoption of this new testing equipment was responsible for reducing the number of persons employed as testers from 28 to 4.

The manual testing system involved 4 units, with 7 operators to a unit, classified as testers. One operator on each unit would load tubes on a conveyor belt carrying them to 5 operators who would run individual tests for gas leak, vacuum content, grid structure, electrical circuiting, and base contact. The operator would reject any tubes that did not pass these testing operations. An operator at the end of the unit would remove the tubes that passed the tests and pack them in cartons.

The installation of the new automatic unit requires but one operator. Her only operation is loading the tubes on the conveyor belt. The tubes on the conveyor belt go through the 5 testing operations automatically. Tubes that do not pass any one of the 5 tests are ejected onto another conveyor belt. The tubes that meet the test specifications are carried through to an automatic packing device. This automatic operation resulted in a lower labor cost and testing production was increased 3 times.

The installation of the automatic testing equipment replaced 24 testers. These people were placed on jobs in the mounting department and other assembly operations in the plant according to seniority rights.

Management has no problem with the retraining of personnel. The majority of employes, through the bidding on jobs policy, have had considerable experience on various jobs in the manufacture of the firm's products. All production work requires finger dexterity, manual dexterity, and mechanical aptitudes. The automation did not result in the loss of any workers, as all were retained by the company.

3691 - STORAGE BATTERIES - Inventory and Accounting Control

An electric storage battery company has recently installed an electronic computer, "The National Cash Register 315 Cram Computer," to meet the ever increasing demands for information in the operation of the company's business. More specifically it will provide the means for modern and practical inventory management with "operations--research" type techniques. The computer will be applied to customer invoicing and will effect clerical savings. It will be used for mathematical applications for research, and for statistical studies. Foremost in cost saving expected is the inauguration of a new automotive forecasting and inventory control system.

The company has and will continue to employ 11 key punch operators who were an integral part of their data processing unit. As a direct result of the installation, 3 systems analysts and 2 programmers were hired, and 5 tabulating wiremen were layed off. A midwestern division of the company, as a direct result of this computer installation, was required to employ 3 systems analysts who prepare material for processing prior to its transmission to this city.

GENERAL COMMENTS

This industry has shown a steady increase in employment during the past 15 years with total employment rising from 111,100 workers in 1950 to 138,800 in January 1965.

It is significant that many employers are turning to the use of computers to reduce high operating costs in such areas as accounting, sales, inventory and production, as well as devoting time and money to the development of new automated equipment by their own personnel to help reduce high production costs and assure subsequent labor savings.

III. TRANSPORTATION, COMMUNICATION, ELECTRIC, GAS AND SANITARY SERVICES

TELEPHONE COMMUNICATION

4811 - TELEPHONE COMMUNICATION - Merger and Dial System

This company purchased a number of small Telephone Companies during the past few years and operated them with the same equipment originally installed when the companies were formed to provide local communities and farm areas with telephone service.

After purchase, a rebuilding program was initiated. New poles were installed together with cable lines in place of the former single wire and cross arm system. This resulted in a reduction in the number of breaks in the wires and improved service to the customers. In addition, the construction and repair crew was reduced from 30 to 21 men.

The company operated 11 separate exchanges employing women operators. The switchboards were manually operated by manipulating switch keys and cord connections. Cords were inserted into jacks and keys were used to ring the phone of the party requested. The operators also performed a variety of clerical duties which included keeping records of toll charges on incoming and outgoing long distance calls. This type of manual operation required the services of 120 operators.

In order to improve customer service and reduce the time the lines are tied up under the manual system, the company began installing automatic equipment which would permit customers to complete a local call by dialing a seven digit number. If an out-of-the-area call was to be made an additional 4 digits were used. The number combinations were different for private and party lines. When a person-to-person long distance call was to be made the operator handled the call and made the same records as before the dial system was installed.

By installing this automatic system there was an increase from 3 to 5 in the number of persons required to keep a panel board in operation. However, there was a decrease in the number of telephone operators from 120 to 42 as the result of the increased capacity of the equipment. This was all accomplished by the installation of Stromberg Automatic XY Equipment.

4811 - TELEPHONE COMMUNICATION - Dial System

Two central telephone exchanges were converted to modern dial operation on August 16, 1964. The conversion is the result of a 2 year construction program and expenditure of over half a million dollars. The exchanges are owned and operated by a local telephone company.

Telephone subscribers dial their own numbers without going through the operator. Dial system in effect. Seven female switchboard operators on permanent layoff.

GENERAL COMMENTS

The telephone industry, as a public utility, is naturally dedicated to the improvement and expansion of services to the public. Automation and technological improvements are intrinsic to the accomplishment of this goal, and, for this reason the industry has long been regarded as pioneers in the development and application of automated processes.

Also, from a very practical point of view, telephone companies have been forced to automate due to the population growth and the ever increasing demand for their service. For example, it would be economically unfeasible and impossible to provide plant facilities for the number of telephone operators needed if automation had not been adopted. Without automation, the cost of this necessary public service would be beyond the means of the average user.

Displacements in this area have been minor and many telephone companies have been forced to alter their personnel policies and utilize married women who had previously been forced to resign upon marriage because of former company policy.

ELECTRIC, GAS AND SANITARY SERVICES

4911 - ELECTRIC COMPANIES AND SYSTEMS - Modernization

This power company has experienced occupational changes due to automation. The following explains the nature of these changes:

a. Bucket trucks were installed on line maintenance and construction. This process reduced ground crews and linemen. No layoffs - 30 men transferred to other departments.

b. Billing department eliminated locally due to a new computer machine. Approximately 20 clerks laid off. Ten transferred to main office.

4911 - ELECTRIC COMPANIES AND SYSTEMS - Meter Reading

A manufacturing company has experimented with, and developed through the cooperation of the engineering staff of a well-known telephone company, a technique which will enable utility companies to obtain accurate meter readings without the services of a meter reader. As described by the telephone company official, the utility company need only dial a customer's telephone number and a special adaptation of electronic equipment to the meter will send electrical impulses into a central data-processing center from which the customer will be billed. Today, the application will be tried in a nearby town. If successful, it will apply initially with gas companies and their industrial customers.

GENERAL COMMENTS

Employment in public utilities rose to a high of 99,800 workers in 1957. Since then it has steadily declined to the present total of 87,900 in January 1965. This decline in employment at a time when the industry is expanding services to a growing population is probably the result of such factors as the (1) installation of computers to reduce costs of accounting, billing and service record data, (2) continued modernization of plant facilities and equipment, (3) introduction of new labor saving devices for easier line and pipeline servicing which require less service personnel, and (4) leasing of expansion activities to private contractors to relieve the public utility companies of maintaining large construction forces.

IV. WHOLESALE AND RETAIL TRADE

GROCERIES AND RELATED PRODUCTS

5044 - POULTRY AND POULTRY PRODUCTS - Egg Processing

This company is primarily engaged in the wholesale distribution of poultry products. They collect eggs from local farmers, who in the past have washed and graded the eggs before being picked up.

The company has now expanded their facilities and has installed an almost entirely automatic machine that is able to take unwashed and ungraded eggs and washes, rinses, candles (with the help of an operator) and grades (sorts) eggs into 5 or 6 different sizes.

An operator with the aid of a pneumatic lifter places 30 eggs at a time in the machine. An assembly line then moves the eggs slowly through a hot water and detergent bath that washes them. A hot water rinse follows and they are then forced-air dried while still moving. The eggs then pass over a very strong light which illuminates about 60 eggs at one time. An operator picks out all the imperfect eggs which are then sent to another area for regrading. As the line continues to move, it automatically sorts the eggs as to size and diverts them into their correct bins. There they are boxed (by the dozen) and sent on for packaging by the carton.

With the help of this machine, this company can now handle 30 to 35 cases of eggs an hour (360 eggs a case), which they could not process at all before.

At the present time they have added about 600 cases a week to their weekly production without the addition of any new personnel. No loss of jobs resulted from the installation of this new equipment.

GENERAL MERCHANDISE

5311 - DEPARTMENT STORES - EDP for Accounting

All inventory control is now on IBM. Installation of this equipment replaced 7 inventory clerks, 6 of whom were trained to use the IBM equipment and one was transferred to the retail sales department. Use of the IBM equipment also led to 4 new hires specifically for the IBM operation.

EATING AND DRINKING PLACES

5812 - EATING PLACES - Vending Machines

One of the fastest growing industries in this country today is that of the vending field. Capturing a growing percentage of retail sales, vended merchandise has nearly doubled in volume in the last 10 years. For instance,

$1.5 billion of merchandise was vended in 1952 and almost $3.0 billion in 1962. Industry sources project $3.5 billion - $4.0 billion by 1965 with an expected $5.0 billion - $6.0 billion by 1970. The rising population, technological developments such as the dollar bill changer, and the basic economics of the industries, point to the continued growth of vender's basic items such as quick snacks, candy, cigarettes, and soft drinks.

Of this basic group, attention should be paid to the area with the most future potential, that of institutional and industrial food service. Several factors brighten this outlook. Industries are tending to move to the suburbs where few restaurants are available. The steadily rising labor costs of manual food operations, a diminishing source of food service personnel, and the trend toward a shorter work day with a quick lunch are also factors which encourage the great utilization of vending machines. Thousands of coin-operated snack bars and cafeterias are already serving schools, hospitals, and industrial plants. In addition to the fast manner of institutional service, the areas of high traffic such as transportation terminals and shopping centers also offer great potential for vending sales.

This company operates automatic food vending machines consisting of a battery of 8 to 10 machines in a given location. The company maintains its own company-trained personnel on location during peak periods to insure customer satisfaction.

An automatic cafeteria provides complete meals in varying price ranges - hot and cold meals, platters or sandwiches, fresh fruits, fresh salads, and desserts. The menus are changed each day. The company's commissaries, located nearby, prepare the food for the itinerant locations.

This company, like other major vendors, takes over a plant's complete vending operation with machine-served cafeterias as well as outlying machines.

In the process of such an installation, there are jobs and persons no longer needed. The food serving is now done by a battery of 8 to 10 automatic machines, which are attended by 1 or 2 girls (Snack Bar Attendants). and can serve approximately 100 to 800 persons. Manually-operated cafeterias of similar proportions would approximately employ 3 to 8 persons. The jobs in such an operation that would be affected would be cashier, counter girls, steam attendants, dish washers, cooks and salad girls.

Looking at the other side of the picture, it is more promising. Aside from employing 1 or 2 snack bar attendants, the company must service such equipment and also transport the food items to the itinerant locations. The snack bar attendants inventory the food on a daily basis, and based upon daily menus, order their needs from a commissary. These girls also handle the money from the machines and see that the service to the customer is adequate. They are also responsible to see that the food vending machines especially are kept clean on the inside and the outside. In addition, they perform clerical work such as stockroom inventory each month and maintain sales cards which must balance with the merchandise sold.

The commissary where the food is prepared employs Route Salesmen who operate a fleet of trucks used to deliver the food to the various locations. The trucks must be kept in good repair. Therefore, it is necessary to employ truck mechanics and related workers. The operations in the commissary - the preparation of food - employs cooks, sandwich girls, salad girls, food handlers, truck loaders, etc., many of whom can be utilized from the previously manually-operated cafeterias. In a highly efficient operation such as this, it is necessary to have a machine maintenance man on call to service the equipment upon short notice. These men operate from radio-controlled trucks usually equipped with accessory parts and so forth to make quick repairs. They are called Field Mechanics.

When it is necessary to remove or install equipment, we find that installation men are used, some of whom must have some electrical knowledge. There are also laborers used to move these machines from the plants to the trucks and vice versa. When it is determined the piece of equipment needs major repair work, it is then moved to the company's maintenance shop. There we find skilled mechanics who are able to rebuild the machines from standard parts repairing electrical parts and sections. Laborers move these machines from one location of the shop to another as required. Spray painters are employed to refinish the machines before installation. It is also necessary to have a foreman in charge of such a maintenance shop. Thus, where some jobs have been eliminated and caused unemployment, this company has shown where new jobs have been created, therefore, helping to take up the slack in the unemployed group. In addition to this increase of new jobs, it is possible that many of the commissaries can use some of the people that were laid off.

GENERAL COMMENTS

The primary objective in this industry is to provide goods and service allied to the products as rapidly and conveniently as possible. Modern packaging and processing equipment has made this possible. The basic element yet to be reckoned with was the large and substantial labor force necessary to carry on this industry, such as warehousemen, clerks, bookkeepers, sales clerks, etc.

However, modern warehousing equipment such as palleting, fork lifts and dock loading machines have substantially reduced the labor force in this area.

EDP equipment is also now making it possible to substantially reduce the number of workers needed to post sales, bill and credit customers' accounts, keep ledger accounts, maintain store inventory records, etc. New facility layouts and self service facilities further reduce the number of sales personnel needed.

In spite of these improvements, employment in this field has increased from 648,400 in 1950 to 673,500 in January 1965. Continued increase can probably be expected as this service industry continues to expand with the growing population.

V. FINANCE INSURANCE AND REAL ESTATE

BANKING

6011 - FEDERAL RESERVE BANKS - Check Sorting

This Federal Reserve Bank operates as a clearing house for member banks who own stock and select the Board of Directors. It has very few accounts of its own.

This company has installed and has, in limited operation, a Burroughs Check Sorting Machine having a capacity of 60,000 checks an hour. To be cleared by this machine, the checks must be preprinted with a code indicating an individual account. When the check is submitted for clearance, it is placed in an Encoding Machine which prints the amount next to the account code. A stock of these checks is placed in the feeding mechanism and, since the printing is in magnetic ink, the codes are scanned magnetically and compared to the account against which the check is being cleared. This machine does accounting only to the extent of giving a total for each bank involved. Previously, clearance was done on proof machines, a procedure with a capacity of 8,000 checks a day.

None of the 140 people will be released as a result of installing the new machine. All will be retrained and given positions in the new operation before additional hiring is done. As use of the machine increases, additional personnel will be hired to operate the Encoding Machines. Since an available supply of experienced Encoding operators does not exist, the company will train entry workers.

Machine was placed in operation in June 1964. The company anticipated hiring 20 girls at the beginning of the summer, but hired only one.

No significant change in this employer's hiring has been noted. Use of machine will increase over a period of 1 to 2 years. Additional personnel will be hired as needed over this period.

6022 - STATE BANKS - Check Sorting

Below is one industry that by installation of new equipment in a bank has required the employment of some additional personnel.

Installation of a check-sorting clearing operation several months ago, an operation that was formerly performed in Pittsburgh and Philadelphia banks but now, out of necessity for more efficient operation, transferred to local bank. This operation sorts checks from 18 banks in other localities which results in sending checks to appropriate banks in 30 other localities. This is simply a speed-up from manual operation to automated operation. The same firm has opened a new drive-in facility and installed an IBM Data Processing Center. This machine handles payroll and related work, data worked up on punch cards, including tax and other payroll deductions. Cards are fed into machine and payroll checks written ready for distribution.

The new check-sorting operation resulted in the hiring of 4 additional people. The new IBM Data Processing Center resulted in the hiring of 3 additional people.

6022 - STATE BANKS - EDP

The banking firm involved has 47 community offices in addition to the main bank.

In April 1964, an IBM 1401 Computer was installed at the main bank. The computer is used to compute company payroll and to handle loan transactions, mortgage transactions, and the bookkeeping for accounts with the bank.

The installation has affected approximately 30 bookkeeping machine operators who previously operated bookkeeping machines to post accounts and handled loan transactions. They have not been furloughed, but have been transferred to other departments as tellers, typists, etc. A few were trained to operate the new computer.

6025 - NATIONAL BANKS - EDP

This national bank is a large local organization which provides both banking and trust services. It has a total of 58 branches throughout the metropolitan district, 8 of which are in the downtown area. The total number of employes varies throughout the year, with a peak of 2,500 in June and July.

During 1963 the installation of automated accounting machines eliminated the need for the services of 67 bookkeepers. This was primarily due to the automating of downtown accounts. None of these bookkeepers were dismissed. Instead, they are being retrained for transfer to other positions, such as typist and stenographer. Where there is no immediate vacancy, these people are given "busy work" to keep them on the payroll. Some bookkeepers have resigned rather than transfer to another position and because they are bored with the "busy work."

In the early part of 1964 additional accounts were automated. This eliminated the need for 60 more bookkeepers. These people were retained and transferred to other positions as the need materialized.

6025 - NATIONAL BANKS - EDP

When this bank installed 2 National Cash Register Postronic Bookkeeping Machines in 1958, all bookkeeping for the 3 branch banks, formerly done at the individual branches, was transferred to the main bank. These 2 machines replaced 3 conventional bookkeeping machines, and require 2 operators as opposed to 6 bookkeepers. Two of the bookkeepers were retained and 4 were separated because they did not wish to transfer to the main bank. These machines were responsible for increased production but, what is more important, have increased efficiency.

A proof machine was installed which prints in magnetic ink the amount of the check, compares it against the account code, sorts it, and stamps the bank endorsement on it. This combines 4 separate operations into one. This is a saving of an undetermined number of man hours but has not involved release of any personnel. It has merely freed these people for other duties.

No significant hiring has been noted for this employer. Should volume of business warrant, they are set up to install a computer which would fully automate this department and additional personnel would be hired.

6025 - NATIONAL BANKS - EDP

The banking firm involved, which has a considerable number of banks in a large Metropolitan area, recently effected a change in their bookkeeping system. The change affected 6 positions at the local bank.

All bookkeeping for the various local banks, formerly accomplished at their individual locations, is now being handled by automation equipment at the principal bank. The 6 positions affected were: Supervisor (1 male); Bookkeepers (2 males and 3 females). There are 4 pick-ups made by vehicle each work day at the local banks. The information is transported to the principal bank where it is processed by the automated equipment. The necessary statements are then mailed directly to the customer. No part of the recording and/or mailing is handled by the local banks unless follow-up work is required on some accounts.

Of the 6 positions involved, 1 female quit, 1 female was laid off, 1 male joined the Armed Forces, and the remaining 3 were absorbed by the local bank in other positions. The net result was 3 of the employes were retained by the local bank and 3 left the company due to the change. There will be no replacements made for the 3 positions vacated by those leaving the company. The net loss in positions was 6. It could not be determined how many positions have been lost throughout the entire company but, using the local situation as an example, it can be presumed to have involved over 350 positions (since 6 positions x 64 banks would total 384 positions).

6025 - NATIONAL BANKS - EDP

In 1960 this bank installed their first two data processing machines. To operate these 2 machines 8 specialized personnel were required. Since then additional computers have been installed so that the company now has one Remington Rand 1401 Computer, 2 Burroughs 220 Computers and 1 Burroughs 270 Computer. However, total employment has increased from 2,800 to 3,150 through the use of computers.

The computers allowed the company to offer many new and expanded services to customers. An increase in total volume of business and the creation of 5 additional branch offices in various sections of the area also resulted from the use of these computers.

No one was terminated as a direct result of automation. The file clerk section has decreased in this 3-year period from 216 to 98. Those who were transferred from the file department were trained and promoted to new positions such as key punch operators, librarians, computer operators and sorters. Other new positions added were programmers, project planners and computer technicians.

Employment in the data processing department has increased from 50 to 167.

The company has on order 5 more computers including a Burroughs 5000, one of the largest computers in use today. The introduction of these additional machines will probably further expand the company's activities, total employment and number of new positions.

The operations eliminated through the use of additional automation in this bank have been mainly limited to posting clerks, bookkeepers and bookkeeping machine operators.

CREDIT AGENCIES OTHER THAN BANKS

6146 - INSTALIMENT SALES FINANCE COMPANY - Centralized EDP

This organization is a large automobile finance company employing 69 persons in its local office.

Prior to the conversion of their accounting department to automation, all accounting, credit, and billing operations were done by hand. Automation in the accounting department was effected several months ago and only new accounts are being serviced in this manner. Old accounts will gradually be added to the system with complete automation being achieved by the end of 1964. No computers are installed at the local office. The accounts are prepared for automated servicing locally and mailed at the end of each day to a metropolitan area where the machines are installed. The only equipment retained by the company locally is one keypunch machine.

The 20 people affected by the change will not be discharged but will be transferred to other departments. The women will go to the credit department and the men into sales and collecting. This company is overstaffed and, as people leave, the positions will be filled by employes within the organization. Therefore, this company will do no hiring until the surplus employes have been absorbed. Since the company's staff is very stable (the average length of service being 15 years), it is not possible to estimate when the company will be in a position to hire new personnel.

INSURANCE CARRIERS

6324 - HOSPITAL AND MEDICAL SERVICE PLANS - Computer System

This organization initiated a Computer Installation in December 1964 which will be completed by July 1965. Two assistant supervisors in the clerical operation have been transferred to purchasing and to direct billing control functions. Four general clerks will be displaced when computer has been installed. These clerks will be used in various sections where they are needed.

INSURANCE AGENTS, BROKERS AND SERVICE

6411 - INSURANCE SERVICE - EDP

In April 1964, this insurance company employed 70 people and the payroll, monthly billing, and quarterly reports were handled by one payroll clerk and one general office clerk.

During the latter part of April, electronic data processing equipment was installed. With this equipment only one employe now takes care of the payroll, monthly billing, quarterly reports, etc., even though the company has expanded to 146 employes.

It was quoted that with the EDP equipment, one payroll clerk and at least 3 general office clerk jobs were nullified.

GENERAL COMMENTS

One of the biggest problems in firms in this area was the fantastic amount of paper work required for daily operations. Business was expanding almost beyond their physical ability to record daily transactions in a timely and efficient manner.

Through the installation of EDP equipment they can now easily take care of daily routines and have the capacity for endless expansion to meet new and changing demands.

Displacement of personnel in the clerical areas are obvious but the characteristics of the work force involved make it possible for normal attrition to offset the displacements. Overall employment in these fields has increased rapidly from 121,500 in 1950 to 158,100 in January 1965. Future employment opportunities appear good for those with training for EDP equipment. These industries should continue to expand with the population growth.

VI. SERVICES

PERSONAL SERVICES

7211 - POWER LAUNDRIES - Ironing

Company installed automatic folders on sheet ironing machines. It also installed shirt ironing machines operated by one person to replace former machines which required 2 people. Automated washing machines were then added and seven people were affected but placed in other areas of the plant. During this transition, the staff increased by 10 because of business increase.

7211 - POWER LAUNDRIES - Folding

On February 1, 1965, this company expects to install an Automatic Folding Machine in its laundry. This machine will take the place of 3 persons now folding sheets by hand. At this point, local manager hopes to absorb these folders somewhere along the ironing process line but feels they may have to be laid off.

7212 - LAUNDRIES, EXCEPT POWER - Mechanization

This company has doubled its output through acquisition of modern laundry equipment over the past 2 years while maintaining the same work force of 10 persons. Mechanized equipment most responsible for increased production is an American 4-roll Return Feeder Mangle and Prosperity Button Operated Sleeve and Body Machines.

Large capacity Troy washers were installed in 1963 which are now operated by washing-machine men. It is expected these will soon be replaced by automated washers which discharge the load into hand trucks. Female employes may then be used in the wash room.

The operators of the mangle, called feeders, placed flatwork on the machine where it is carried through and pressed. The new machine has doubled the previous model's output.

Shirt operators iron sleeves in the button operated, timed cabinet unit in 17 seconds where 64 seconds were required in the former model. Bodies are now ironed in one less "lay" with 3 fewer operations. Shirt output per operator has been increased from 10 an hour to 23 1/2 an hour.

Retraining the work force to operate the new equipment was accomplished with no difficulty. Training time for new workers has been reduced as management feels a lesser skill level is now required.

The necessary increase in sales was secured by supplying linens to hotel and motels and by expanding delivery routes to nearby communities.

This establishment installed an automated Steam Press unit which steams men's trousers and presses them. The unit is known as "Cleanamation." It is made up of 2 separate machines. One machine steams and presses the upper front part and presses the pleats. The upper part of the trousers are slipped over a padded form-fitting device which is vertically positioned, allowing the legs to dangle free. The operator pushes a plate located at floor level, with foot, which activates 2 pressing heads, causing them to descend and push against the upper front part of trousers, pressing them. The 2 pressing heads release automatically, returning to their original position.

The second machine is fashioned after the formerly used Steam Presser except it is automatic. After the operator has completed the first operation of pressing the upper part, he removes the trousers from the holding form and places them on the buck (convex ironing board) of the other machine. The trousers are smoothed out by hand on the buck to prepare them for pressing. Then the operator pushes another plate, located at floor level, which activates the pressing head, causing it to descend and press the trousers. The pressing head releases automatically to permit removal of the trousers and ready the machine for the next pair.

The 2 machines are located adjacent to each other for the reason that the operator must alternate between the 2, preparing one machine for the next pair of trousers, while completing the operation on the other. The operator must be agile since the automatic timing period is short, and it is desirable that time loss be kept to a minimum. Ambidexterity is a desirable trait for operators.

The employer states there will be no loss of personnel for the present. The old system of manually-operated presses permitted pressing an average of 20 pairs of trousers an hour. The newly installed automation system will average around 40 pairs an hour. The machine can be adjusted to speed it up to 60 pair an hour, but the employer of this particular shop desires to hold it around the 40-an-hour quota in order to maintain his standard of quality of work.

The volume of business will govern whether or not there will be any loss of personnel. If the business volume is maintained, his present staff will continue. If the volume drops, the Cleanamation Operator (who is experienced in other duties in the establishment) will work at other duties in the plant.

This installation means doubling the production in the trouser-pressing phase of the plant. The employer is of the opinion that a plant employing operators of the automation machine who are not qualified to do other duties in the plant may be faced with the situation of effecting layoffs when a reduction in volume occurs.

It is not known how many dry cleaning establishments using this automation equipment are located throughout the State. However, it can be assumed that there are a large number. Locally, there are 4 establishments which do such processing.

Installation of such equipment will probably affect the industry as a whole-either through requiring less personnel to operate the plants now in business, or placing these firms in such a competitive position that some of those not installing such units will lose out. It may also eliminate or decrease to a large degree the number of new firms desiring to start up since this automated process necessarily reduces the number of establishments needed to serve the public (produce more volume with less equipment and personnel).

This employer first considered this change 2 years ago when he saw the automated machine on display at a Dry Cleaners' Convention in Chicago. With his volume of business increasing steadily, he and his wife were required to work 7 days a week to cope with the "paper work" and also process the customers' articles. It was not feasible to install additional machinery since a space problem would result. His only alternative was to purchase the automated equipment which requires less space, increases production, and does not require additional personnel.

MISCELLANEOUS BUSINESS SERVICES

7331 - MAILING LISTS - Mechanization

This company, one of the largest mailing services organization in this metropolitan area, has been expanding each year since 1960. The expansion in production has been approximately 25% yearly. However, personnel has been stable with no increases due to new automated equipment. For example, 3 Cheshire Labeling Machines, manufactured by Cheshire, Inc. of Chicago, Illinois, were purchased, one in 1960, one in 1961, and one in 1962.

These machines are operated by 2 skilled and 3 semi-skilled workers, and have the same productive capacity formerly requiring 40 unskilled workers.

During the same 3 1/2 year period, 8 Phillipsburg Inserting and Mailing Machines were installed. These are operated by one skilled and 6 semi-skilled workers, replacing approximately 48 workers.

In addition, 11 new Bunn Typing Machines were purchased from the B. H. Bunn Company, Chicago, Illinois. These have replaced an additional 6 unskilled workers. Also, the purchase of a new improved Phillipsburg Master Mailer (for delivery this year) will replace an additional 14 unskilled workers.

Seasonal changes create a highly fluctuating employment pattern in this company although it is one of the more stable employers in the industry. To date this employer has been training unskilled personnel to operate the newly purchased equipment. Peak employment is usually from mid-December to mid-April, and from the end of July to mid-November. Low employment is from the end of April to mid-July, and from mid-November to mid-December.

This company has increased production and sales since 1960 by 75 percent. Production employes averaged 67 in 1960, 58 in 1961, 64 in 1962, and 70 in 1963. Using the old equipment on hand in January 1960, the plant would have to employ an additional 94 unskilled workers during peak seasons. The volume of business since 1960 has increased from $400,000 to $650,000 a year with substantially the same number of employes and the elimination of overtime, which represented a large portion of operation costs.

The future outlook (due to continued technological improvement) indicates no hiring of unskilled workers and that some of the present unskilled staff will be trained and upgraded.

7391 - PETROLEUM RESEARCH - IBM Unit

This corporation has completed installation of the huge IBM unit in their new building. They now have a $2,000,000 IBM unit - the largest unit of its kind - which does all the work for the whole corporation. This unit has displaced some personnel such as clerical help, laboratory technicians, data workers and some others. However, since the unit is so complex, it has created a need for highly skilled and trained engineers, PH. D's, to operate it. They have the first industrial installation of a computer combination in which one computer tells the other what to do.

This multi-processing computer, IBM 7040/7094, interconnected core to core, or memory to memory, has been used by the government in aerospace work but this is the first industrial concern to use this combination of computers. The computer team-up means higher speed and a larger work load for the electronic brain. The 7040 gives orders to the 7094, thus allowing the 7094 to do only high speed computing.

The 7040 provides the 7094 with an efficient assembly-line schedule by freeing it from being bogged down with input-output work and stores problems until the "mastermind" is ready for them.

By 1970, nearly all computers will be able to handle needs of persons in obtaining, originating or utilizing information from a personal console placed a few feet or a thousand miles from the computer.

MOTION PICTURES

7831 - MOTION PICTURE THEATERS - Ticket Taking

This large theater chain had, until about 2 years ago, sold tickets and had them taken at the door by a ticket taker. When remodeling occurred in a number of theaters in this area, turnstiles were installed and a barrier erected across the outer lobby. The outside ticket booth was removed and a counter provided inside the lobby for the cashier who is no longer a ticket seller. The customer buys a token or tokens from the cashier and places them in a slot in the turnstile to gain entrance.

Separate turnstiles are provided for adults and children and they are operated by tokens of different sizes. Token size is changed when afternoon prices are changed to evening rates or vice versa. The cashier uses a key to change the size token which will be accepted by the adult turnstile while the one for children remains at the same price.

Each hour the cashier records the turnstile meter readings and posts them to a simple report form. She watches the turnstiles to discourage climbing over or two persons entering on the same token. When this occurs she remembers the persons and stops them if they commit a second offense. The cashier is also responsible for honesty since no check can be made by ticket serial numbers to see if the doorman had collected all the tickets sold. Tokens are good until used and some patrons buy them in advance, while tickets were good only during the hour in which they were sold.

The ticket taker positions were eliminated. This resulted in the layoff of 2 men, both over 70 years of age. One had 12 years service and the other had worked at the same location since he played in the orchestra of what was then referred to as the opera house. This type of job has traditionally been used to supplement the income of older persons with small annuities, and the loss of such positions in this industry is unfortunate for older workers.

Because tokens are reused a considerable saving has resulted. No tickets are purchased from ticket manufacturers and no machine is required to feed tickets up through a slot in the cashier's counter. It is difficult to evaluate the effect of this change on ticket manufacturers.

While doormen are no longer employed, it is still necessary to have an usher stand near the turnstiles at rush hours to assist people who do not know how to operate them. This may be due to the relative rarity of turnstiles in rural areas but it appears that automation does not so much reduce the need for people as it changes jobs.

MISCELLANEOUS SERVICES

8999 - COMPUTER SERVICE - Information Center

This firm uses automated equipment for the processing of various types of information received from concerns throughout the city. Work is done on a contractual basis.

The concern has recently replaced 10 key punch machines with 8 electric typewriters. This was due to the installation of a "Farrington Scanner," an electronic device which reads typewritten material and puts this information on tape. As a result, key punch machines which cost $18,000 each were replaced by electric typewriters which cost $450 each. This effected a great savings.

Management further claims that a typist can type more words a minute and more accurately on the electric typewriter than on the keypunch machine, thus increasing the volume handled. Eight of the 10 keypunch operators were retrained on the electric typewriter and the other 2 were reassigned as proof readers.

GENERAL COMMENTS

This segment of the workforce has enjoyed a tremendous increase in recent years - rising from 388,000 in 1950 to 523,700 in January 1965. Even with the use of computers and more and more automated equipment, employment in this field should continue to grow as the population increases and technological change provides more leisure time.

A summary of facilities included at today's modern shopping center illustrates future trends for such employment in suburban areas.

Retail Trade

- Food Market
- Dairy Stores
- Candy Shop
- Drug Store
- Department Stores
- Gift Shop
- Furniture Store
- Restaurants and Bars
- Liquor Store
- Beer Distributor
- Automobile Service Station
- Automotive Service Center
- Radio and TV Sales and Repair

Service Trade

- Bank
- Financial Loan
- Barber Shop
- Beauty Shop
- Laundromat
- Dry Cleaning
- Travel Agency
- Movie Theater
- Medical Center
- Municipal Headquarters

VII. GOVERNMENT

LOCAL GOVERNMENT

9349 - ELECTRIC, GAS AND SANITARY SERVICES - City Water Distribution

Prior to 1959, the Distribution Division of the City Water Department of this large metropolitan area operated their 18 pumping stations on a manual basis utilizing Pumping Station Engineers to operate the pumps and Pumping Station Operators to open and close valves. The operation was on a 7 day - 3 shift basis.

In 1954, the Water Department began thinking of automated distribution in the terms of a Load Control System. Development of this system was carried on in a period when data handling techniques in the electronic fields were advancing very rapidly. By 1958, the final design was completed and the following year saw the system begin operation.

The basic design of the Load Control System includes 2 major subdivisions. One is the Data Processing Center and the other the Supervisory Control System. The data intelligence currently comprises 100 points covering flow, pressure, and water elevation transmitted to the Control Center from selected field points throughout the system. The basic path for all data transmission and supervisory control signals is provided between the Control Center and all points in the system by the microwave communication network. Logging of the data points on 2 Electric Typewriters is normally scheduled for 30 minute intervals as an automatic function but is quickly adjustable for intervals between 5 and 60 minutes.

The Supervisory Control System now provides for the remote control operation of 10 pumping stations. The goal is that all 18 pumping stations will be controlled by the system early in 1967. Functions such as starting up individual pumps, opening or closing valves, etc. are arranged so that the Load Dispatcher can operate any pump within the aforementioned stations by merely pushing buttons at the Load Control Center. Carrying the system one step further, it is contemplated that the Load Dispatcher's function will eventually be taken over by a computer.

Before automation was instituted, the 18 pumping stations were manned by a total of 20 engineers and 46 operators. Automation was first begun at the smaller pumping stations and the job of operator was eliminated. As the program progressed, the larger pumping stations were automated and the jobs of engineer and operator were also eliminated. At this time, automation is not yet complete and 8 engineers and 5 operators are still working in their classification. By early 1967 these classifications will be completely eliminated.

As in most automation programs, some new job classifications were created. Eight persons holding the previous job of Engineer were appointed as "Roving Engineers." One new position of Load Control Supervisor, 5 positions for Load Control Dispatcher, 5 Electronic Technicians, and one Meter and Gauge Mechanic were also created. As before, the number of positions in the new classifications take care of a 7 day - 3 shift operation.

The effect of the changes on employment was not dramatic. Eight engineers became roving engineers and several others took advantage of their eligibility for retirement. Other workers were retrained through in-service-training to fill such jobs as load control dispatcher, maintenance personnel, distribution repairmen and one was qualified as a machinist. No one was laid off. Every job was accounted for by either absorption or attrition. During the transitional period, the city maintained operating efficiency with fewer personnel by authorizing overtime.

The Distribution Division of the Water Department also operates two High Pressure Fire Stations for the Fire Department which are located in high risk areas of the city. In case of a multi-alarm fire in these areas, the Stations supply additional water under high pressure over a special water system to the firefighters. Like the other pumping stations, the High Pressure Fire Stations will eventually be automated with the resulting termination of 8 Pumping Station engineers and 8 Pumping Station operator positions. These persons will be absorbed into other positions with no adverse effects to the individuals.

Automation of a limited nature has also been introduced at 3 Filtration Stations of the Distribution Division. They have replaced the Slow Sand Process with a Rapid Sand Filter. Operations can now be programmed and controls centralized. As a result, many laborer positions were eliminated or replaced by Filter Plant Operators. New positions for 6 meter and gauge mechanics and 4 electricians were created as a result of the new partially automated process. Ultimate automation is not only feasible but contemplated. In line with the previously stated policy, all the eliminated positions were accounted for by absorption or attrition and no layoffs occurred.

9390 - CITY FINANCE - *Budget and Payroll*

Many of the operating departments of this large city have introduced tabulating machines, key punch operators, and other data processing equipment. For example, the Finance Department has two 1401 Remington Rand Computers to deal with budget and payroll. Introduction of automation has not resulted in termination of a single individual. These displaced persons were retrained for other assignments either within their own department or elsewhere.

The departments in which data processing has been installed have a coding system peculiar to it and data cannot be readily transmitted from one department to another. As a consequence, future plans are to consolidate all departments under one central electronic data processing department which will result in increased efficiency and financial savings. The conversion to this type of system will take place with the utmost regard for present personnel and separations will be kept to an absolute minimum.

GENERAL COMMENTS

This group also shows a tremendous increase in employment opportunities with a continuing rise from 338,700 in 1950 to 490,000 in January 1965. This trend is likely to continue since the demand for Local, State and Federal Government services is commensurate with population growth. Expansion in such allied activities as national defense, social security, unemployment compensation, public employment service, war on poverty, etc., tend to confirm this trend. The application of automation techniques is a must if these services are to be adequately provided.

VIII. DETAILED INDEX OF REPORTS

STANDARD INDUSTRIAL CLASSIFICATION	INDUSTRY	TECHNOLOGICAL CHANGE
1211	Bituminous Coal	Continuous Mining Method
1421	Crushed and Broken Stone	Quarry Operations
2013	Sausages and Other Meats	Continuous Wiener Process
2015	Poultry Dressing and Packing	Chicken Plucking
2024	Ice Cream and Frozen Desserts	Popsicle Assembly
2024	Ice Cream and Frozen Desserts	Ice Cream Molds
2024	Ice Cream and Frozen Desserts	Carton Conveyors
2033	Canned Fruit	Apple Peeling
2035	Vegetable Sauces and Seasoning	Packaging
2037	Frozen Fruits	Frozen Pie Assembly
2043	Cereal Preparations	Cereal Coating
2051	Bread and Bakery Products	Bulk Storage
2052	Biscuit, Crackers, etc.	Potato Chip Bagging
2085	Distilled Liquors	Bottling, Labeling and Packing
2121	Cigars	Homogenized Tobacco Leaf
2121	Cigars	Wrapper Layer Machines
2121	Cigars	Automatic Machines
2121	Cigars	Wrapper Layer Machines
2121	Cigars	Automatic Lifts
2221	Broad Woven Fabric	Bobbins
2282	Yarn Throwing, Twisting, etc.	False Twist Machines
2311	Men's and Boys' Suits, Coats, etc.	Automatic Processes
2321	Men's and Boys' Shirts	EDP for Sales Records
2421	Saw and Planing Mills	Logs to Lumber
2426	Hardwood Dimension and Flooring	Glue Machine
2431	Millwork Plants	Cabinet Finishing
2521	Wood Office Furniture	Conveyor Lines
2621	Paper Mills	Paper Making
2621	Paper Mills	Quality Control
2641	Paper Coating and Glazing	EDP in Office
2711	Newspapers, Publishing	Linotype
2732	Book Printing	Tape Controlled Type Setting
2751	Commercial Printing	Offset Press
2761	Manifold Business Forms	Continuous Process
2789	Bookbinding, etc.	Collating

STANDARD INDUSTRIAL CLASSIFICATION		TECHNOLOGICAL CHANGE
2818	Industrial Organic Chemicals	Computerization
2834	Pharmaceutical Preparations	Misc. Machinery
2834	Pharmaceutical Preparations	Bulk Handling
2842	Spec.Cleaning and Polishing Preps.	Bottling
3011	Tires and Inner Tubes	Curing
3141	Footwear, Except Rubber	EDP for Mail Orders
3141	Footwear, Except Rubber	Cementing
3142	House Slippers	Lasting and Cementing
3211	Flat Glass	Numeric Control
3221	Glass Containers	Forming
3229	Pressed and Blown Glass	Capping
3229	Pressed and Blown Glass	Blowing
3241	Cement, Hydraulic	Electronic Control
3241	Cement, Hydraulic	Conveyors
3262	Vitreous China	Miscellaneous Machinery
3264	Porcelain Electrical Supplies	Transfer Devices
3271	Concrete, Brick and Block	Continuous Process
3312	Steel Works	Oxygen Conversion
3312	Steel Works	Vacuum Furnace
3312	Steel Works	Degassing Process
3312	Steel Works	Time Keeping
3312	Steel Works	Plant Modernization
3312	Steel Works	Open Hearth
3312	Steel Works	Oxygen Conversion
3312	Steel Works	Oxygen Conversion
3317	Steel Pipes and Tubes	Continuous Weld
3323	Steel Foundries	Automatic Heating
3323	Steel Foundries	Continuous Casting
3351	Rolling, Drawing and Extruding Brass	Plant Modernization
3352	Rolling, Drawing and Extruding Alum.	Numeric Control
3352	Rolling, Drawing and Extruding Alum.	Numeric Control
3361	Aluminum Castings	Shell Core Machine
3391	Iron and Steel Forgings	Carbide-Tip Tool
3496	Collapsible Tubes	Plant Modernization
3499	Fabricated Metals	Continuous Process
3532	Mining Machinery and Equipment	Numeric Control
3566	Mech. Power Transmission	Automatic Press
3569	Parts for Atomic Power Plants	Merging Operations
3591	Machine Shops, Jobbing and Repair	EDP Control
3591	Machine Shops, Jobbing and Repair	Numeric Control
3599	Machinery and Parts	Power House Facilities

STANDARD INDUSTRIAL CLASSIFICATION	INDUSTRY	TECHNOLOGICAL CHANGE
3642	Lighting Fixtures	EDP for Accounting
3652	Phonograph Records	Automatic Presses
3671	Radio and TV Tubes	Testing
3691	Storage Batteries	Inventory and Accounting Control
4811	Telephone Communication	Merger and Dial System
4811	Telephone Communication	Dial System
4911	Electric Companies, etc.	Modernization
4911	Electric Companies, etc.	Meter Reading
5044	Poultry and Poultry Products	Egg Processing
5311	Department Stores	EDP Accounting
5812	Eating Places	Vending Machines
6011	Federal Reserve Banks	Check Sorting
6022	State Banks	Check Sorting
6022	State Banks	EDP
6025	National Banks	EDP
6146	Installment Sales Finance	EDP
6324	Hospital and Medical Services	Computer System
6411	Insurance Service	EDP
7211	Power Laundries	Ironing
7211	Power Laundries	Folding
7212	Laundries, Except Power	Mechanization
7216	Cleaning and Dyeing	Cleanamation
7331	Mailing Lists	Mechanization
7391	Petroleum Research	IBM Unit
7813	Motion Picture Theaters	Ticket Taking
8999	Computer Service	Information Center
9349	Electric,Gas and Sanitary Service	City Water Distribution
9390	City Finance	Budget and Payroll EDP